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AUDIO - VISUAL EDUCATION

AUDIO VISUAL EDUCATION is published quarterly

AUDIO VISUAL EDUCATION aims at fostering interest in the use of audio visual techniques in education among teachers and social education workers.

It provides a forum for teachers and social education workers to discuss and share their day to day experiences in this particular field.

It contains stimulating articles (English and Hindi) on various aspects of audio visual education and is profusely illustrated. It gives the latest information about the Central Film Library. It contains a useful feature entitled "How to Make it Yourself".

Contributions for consideration are invited and, if published, will be paid for at our usual rates.

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CONTENTS

The New 8 MM. Motion Picture System — 2
G. K. Athalye

Puppetry for Schools and Colleges — 7
D. L. Samar

Some Notes on Teaching English by Television in Delhi — 11
J. G. Mills

Multipurpose Display Boards — 13
B. R. Sagar

Our Filmstrips — 16
Historical Monuments of Delhi

How to Make it Yourself—No. 16 — 18
(Preparing and Using Graphic Strips)
S. L. Ahluwalia

Programmed Instruction—Promise and Paradox — 20
V. D. Mishra

Central Film Library — 27
(Annotated List of Films)

Farewell to Shri G. K. Athalye — 35

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G. K. ATHALYE

The NEW 8mm MOTION PICTURE SYSTEM

and its application to education in underdeveloped countries.

PREAMBLE

The main purpose of this paper is to present essential information about the position of instructional films as they are used in education in general and to explore the possibility of introducing 8 mm films for classroom instruction in underdeveloped and developing countries of the world. Experimental evidence to establish the fact that instructional films accelerate the process of learning and increase understanding capacity of the students is available in plently. UNESCO Report on this kind of study in the series, "Reports and Papers on Mass Communication", takes stock of the experience in a limited but highly important field of the use of films in the service of education. Though the scope of study in this Report was limited to primary education and the background of the symposium was largely European, the opinions voiced by various writers are fairly representative of the actual state of affairs faced by teachers all over the world where films are being used as auxiliary aids to teaching. Educational film production is restricted to a very few progressive countries and therefore the majority of the developing countries, where films are used in their educational programme, no matter how and in what manner, have to depend on the material produced without any bearing on the environmental conditions obtaining in their own countries. Even so, since many of the instructional films dealing with the scientific and technological subjects are of universal appeal, workers in the field of educational research are interested in evaluating the filmic instructional material and its effectiveness in teaching practice. Among other countries, in India too, studies of this kind are being undertaken in respect of classroom instructional films in Geography and Science. There are no two opinions about the motivational value, interest arousing capacity and knowledge retentive qualities of instructional films. Tests administered over a long period proved that the power of retention of knowledge is enhanced considerably when films are used in classroom lessons.

It is thus an established fact that the instructional film is a friend of the teacher more valued than the age-old textbook, not only for helping him or her to do the regular teaching work more effectively but also to help self improvement, provided of course the teacher is fortunate enough to have an access to such facilities. In the realm of instructional films, an equivalent of paper back cheap edition of a book is therefore the need of the moment.

The root cause of the trouble is the fact that the school on its own cannot find enough funds to invest

on projecting equipment, nor even the State Education Departments subsidise purchase of equipment for this purpose. Budgetary allotment placed at the disposal of the state-owned schools even do not permit the luxury of instructional films. Besides the financial difficulties, there are other reasons which have prevented the growth of audio visual instruction through films, chief among them being :

(i) No school can afford to have a small library of basic classroom films in 16 mm. which have to be borrowed from Central and Regional Film libraries.

(ii) However portable the 16 mm. projecting equipment is claimed to be, it is cumbersome to move from one classroom to another and no school in underdeveloped countries can afford to buy more than one projector.

(iii) A lot of teaching time is wasted in preparing for the screening of educational films, in setting up the equipment, putting up window blinds, acquiring films from different external sources etc.

(iv) There is a definite tendency on the part of those who have got 16 mm. projectors to use them for week-end screening of films for the school as a whole and not for any particular group of children of the same age or interest. Border line cases of schools which may or may not afford to buy projectors have therefore come to look upon 16 mm. projector as a luxury and not a necessity.

With all these drawbacks the educational potential of instructional films cannot still be minimised and something must be done quickly to remove the obstacles in the way of encouraging the use of instructional films in our educational programme. Switching over to 8 mm. seems to be the only answer, since the modern technological progress has made it possible to record sound on 8 mm. film, raising it to the status of a fulfledged cinematographic film in its own right. 8 mm. projector is no doubt a pocket edition of 16 mm. projector and cannot entertain audiences of larger than 100 in size, but for classroom use we do not need equipment for large audiences. However there are many hurdles to cross before this dream of 8 mm. instructional film comes true. It is these hurdles which are occupying our minds at present and it is proposed to discuss them briefly in this paper.

EDUCATION THROUGH FILMS

"World statistics on the non-theatrical film field are largely inaccurate or impossible to obtain. There are indications however, that the free world outside of United States may at the present time, be using almost the same number of 16 mm. sound projectors as are in use in the U.S.A." However, there are complaints even in U.S.A. that the teacher has to wait for a considerable time before a required film is obtained for classroom use. If that is the case with one of the most advanced countries of the world, what should be the plight of underdeveloped countries ? By the end of the last world war and at the instance of UNESCO many of the developing countries, especially those which had acquired freedom immediately afterwards, took up the question of introducing films in education. They were convinced that scientific and technical knowledge could be imparted more speedily with the help of films. In their enthusiasm to provide 16 mm. equipment to all educational institutions as quickly as possible, plans were prepared to provide funds as liberally as possible to attain this goal. Provisions made for this purpose took into account not only the necessity of purchasing projectors and ready-made instructional films from abroad but also the production of films indigenously. The latter programme being very heavy on the budget, only a few years experience was enough to convince the authorities, responsible for launching the programme, that even if the available funds were all utilised on importing projectors and ready-made films from abroad it would take almost a century to equip all educational institutions with 16 mm. projectors. Consequently production programme of instructional films was drastically curtailed with the hope that by doing so, many more schools per year could be accommodated for 16 mm. equipment. Meanwhile the projector cost went up by leaps and bounds, and the rate of growth of number of projectors dwindled down to a mere trickle in later years. As a result the dream of classroom teaching with instructional films remained unfulfilled.

The Central and Regional Film Libraries entirely dependent on Government funds, could not maintain adequate and timely supply of films, since for want of proportionately increasing allocations of funds with growing demand and need for replacement of worn-out prints, it was impossible for them to meet the demand for instructional films. Those responsible for providing funds, had a very queer notion about the life of 16 mm. prints. In the early years of audio visual instruction through films they thought that once the films were purchased they should last for ever, not realising the fact that on many occasions quite a number of prints required replacement after 100 to 150 screenings. This resulted naturally in stunting the growth of film libraries. They are not at all in a position to help those who want to do teaching with films on a systematic basis and on sound educational principles. All that one can hope to achieve at present is to arrange occasional film shows for schools and screen not classroom instructional films but general informational films at that time.

In spite of this sorry state of affairs, there is a general feeling among progressive teachers, that the introduction of a film into a lesson changes the whole classroom atmosphere, which is so accustomed to the standard teacher-pupil dialogue method. State Educational authorities themselves were responsible for creating this task for instructional films and they are now finding it difficult to fulfil their promise to make this powerful teaching tool available on more extensive scale. The fault lies with the circumstances which led to the adoption of 16 mm. films for educational use in the peace-time conditions when allowances made for expenditure on education bear no relation to those made for the purpose of technical training during war-time conditions. The problem before us now, is to see how we can still find a way out and go ahead with the programme which we had envisaged before, in the present day changed circumstances, on the eve of the 8 mm. film promising to come to our rescue ?

No solution to the above problem could have been found if the 8 mm. films were not to make their appearance on the educational horizon. How and why the 8 mm. films are going to help solve the problem presented in the above brief analysis, is to be seen in what follows hereafter.

16 MM. VERSUS 8 MM. PROJECTORS

8 mm. cameras and projectors in their silent versions are in use for over a decade mostly for filmic recording of family events. Recently when magnetic recording of sound on 8 mm. films was found possible, attention of educationists was focussed on the possible use of 8 mm. films for instructional purposes. The Fairchild Cinephonic magnetic-sound recording play-back system set the ball rolling. Soon after Kodak sound 8 projector, Agfa Sonector, 8, Fugica 8 sound, etc., followed suit, although as early as in 1959 Elite 8 magnetic sound projector had already appeared in the market without arousing the interest of educationists. Mansfield Industries and Technicolor Corporation are also in the field to offer low cost 8 mm. silent and sound projectors. A number of other commercial concerns are now getting interested in the production of not only magnetic but also optical sound projectors both in U.S.A. and Japan. Demonstration of regular production models of magnetic sound projectors proved almost conclusively that 8 mm. magnetic sound was not only practical, but also that its quality of sound reproduction was more often than not superior to that of 16 mm. optical sound at 24 frames per second. Most 16 mm. optical projectors have a cut-off point at 5 to thousand cycles per second, whereas 8 mm. magnetic sound projector is capable of responding to the frequency range from 85 to 7,000 cycles per second, at 24 frames p.s. speed. Thus 8 mm. magnetic sound is definitely an improvement on the 16 mm. optical sound.

Although there are some advantages in the optical sound track, the magnetic sound is favoured by those non-English speaking people, who have to use scientific and technical films produced in English speaking countries. Translation in any language is possible to be recorded with care on the magnetic sound track and this is considered to be a great advantage in favour of using magnetic sound films. Therefore magnetic sound films will be doubly blessed by non-English speaking users of films. Fairchild projecting units serve solely for playback, yet even in that case it is possible to get the films previously dubbed in desired language. So far as the sound is concerned therefore, the opinon is in favour of magnetic sound projector for use in educational institutions.

What about then, the screen image of 8 mm. projector ? For domestic use 8 mm. has proved itself entirely satisfactory. The area size of each of the frame of 8 mm. film is one quarter that of the 16 mm. frame. Naturally therefore the picture brilliance over the same area of the projection screen in the case of 8 mm. film would be less than one quarter of that available from 16 mm. films, since the light wastage in the 8 mm. projector is slightly more than in the case of 16 mm. when constructional details of the optical systems are kept identical in both. For educational use, however, we are seeking to use the projector only for classroom instruction and our classroom audience is not likely to exceed 50 or 60. The audience capacity of 8 mm. is set at 50 to 90 on the outside. We have tried to see whether 100 people could be accommodated, and our findings with respect to rear projection screening are most satisfactory. Granting that curiosity factor was more pre-dominant at the first experiment of the kind, to expect genuine and frank criticism from our audience there was no doubt that 50 to 60 people could be easily accommodated for comfortable viewing. It must be remembered, however, that much depends on the conditions in which the screening of a film takes place. Daylight screening on front projection screen, in an ill-darkened classroom, for extra projection brilliance and a large audience requires a large screening area for comfortable viewing. In order to mitigate these requirements the size of the audience must be limited to 90 at the most and rear projection screening should be resorted to, both for extra brilliance and convenience of handling the equipment. Home-made rear projection screen made with ordinary tracing paper and measuring 24″ by 30″ has been found to give most satisfactory results for classroom use both of 16 mm. and 8 mm. projectors, provided the lens of appropriate focal length is chosen, for projecting the picture at a short distance. Fairchild magnetic sound 8, does the job well, but it is felt that a little larger screen than the one provided with it will be more welcome. There is always a practical limit to the image size according to the size

of the audience, but in this paper we should confine ourselves to the instructional use of films in the class-room and in that context a small size screen can be considered good enough for our purpose.

Extra projection brilliance required for daytime screening, has been fortunately made possible by the new type of projection lamp with built-in reflector, which is being used now with 8 mm. projector and in some makes of 16 mm. projectors. These are low voltage, small filament low heat-output type of lamps, which because of the built-in reflectors concentrate heat towards the film gate. But research engineers have now developed dichroic reflectors permitting the lamp to disperse its heat in all directions, instead of directing it towards film-gate. Thanks to these development, 8 mm. projector is certainly heading for giving a star performance in the educational field.

COMPARISON OF LIFE OF 8 MM. & 16 MM. FILMS

Screening-life of each print in the case of 8 mm. and 16 mm. films calls for closer study, in order to satisfy ourselves as to whether the case for 8 mm. could not be made any stronger on that score. Each frame being very small in size, scratches resulting from rough handling at the stage of editing an 8 mm. film are magnified more prominently on the projection screen than in the case of 16 mm. film. However, in the normal course of projection, 8 mm. film has proved itself to be far less prone to damage than the 16 mm. one. There may be some exaggeration in the claim that an 8 mm. print outlasts even a few thousand screenings, but when we consider the life span of 16 mm. print in the neighbourhood of 150 runs only, under the most ideal conditions of usage, we should be perfectly satisfied with 500 screenings with 8 mm. print. Life span of 16 mm. print largely depends on the make of the projector, and the skill of the operator responsible for screening the film. Very revealing statistics were given sometime ago about the technical performance of different makes. According to these, print life varied from 50 to 150 with average makes of 16 mm. projectors. The reasons for longer life of 8 mm. prints are given below :

(i) The film ribbon of 8 mm. is more pliable.

(ii) Film reels carry less weight and consequently there is less damage to prints in storage and in transit.

(iii) The film runs more slowly through the projector, in fact half the length of 16 mm. in the same time.

(iv) Less momentum during the run also retards damaging action.

Further if the films are supplied in dust free cartidges, as in the case of Technicolor and Fairchild projectors, the prints need not even be touched with fingers of the operator. Thus the potential life span of 8 mm. prints is increased enormously, an advantage which cannot be ignored by those who would like to build their own libraries of basic instructional films, which are required to be used frequently.

OPTICAL VERSUS MAGNETIC SOUND FILMS

Optical sound recording on 8 mm. films has been sucessfully achieved in recent years. The Japanese Toei Talkie 8 Optical Sound projector is known to be giving good results at the normal sound speed of 24 frames per second. In 8 mm. magnetic recording however, the speed of 18 f.p.s. is also found to be be satisfactory. The advantage of 18 f.p.s. speed is that there will be 25% saving effected in film footage, with the result that for the same screening time, only ¾ of the normal film material will go into each reel. In spite of the drawback about the possible accidental erasing of the magnetic sound, the opinion in favour of adopting magnetic recording for educational purposes is gaining strength. Magnetic sound recording alone would make it possible to exchange film between countries speaking different languages. Without such exchange there is no hope for promotion of mutual understanding between people of different races, religions and cultures. No doubt there is always a clamour for production of educational films indigenously, so that the natural surroundings depicted in films, would have better appeal to students. This argument does not hold water in the case of scientific and technical films which have got to be produced in their hundreds in different surroundings, and without mutual exchange of such films there is no hope of enriching our instructional film libraries in as short a time as we may desire. For this reason at least the magnetic recording system must be given due credit and considered for universal adoption, in the educational field.

Until such time, when 18 f.p.s. is accepted as the standard speed for magnetic sound on 8 mm. the choice lies between 24 f.p.s. optical or magnetic recording on 8 mm. We already have combination 16 mm. projectors which can use optical and magnetic sound systems. Possibly 8 mm. projectors of this type may be available at a later stage, but today our main concern is to choose between one or the other with an eye on economy.

SILENT OR SOUND, WHICH SYSTEM ?

Here we come face to face with a very pertinent question as to whether sound films are absolutely necessary and if so under what circumstances ? A controversy was raging some years ago on this very point. Some countries in Europe still maintain that silent films serve the purpose of classroom

teaching better than the sound films. We as educationists cannot be carried away by any dogmas in such cases. If instruction through films is intended to be realistic, natural sounds associated with various phenomena in nature should be heard as well as seen. On a number of occasions sound plays an important part in teaching situations, yet is there any justification in foregoing the benefit of a potent visual medium of instruction in the form of silent movie film because it is not accompanied by sound? If certain categories of schools cannot afford to have sound projectors, I think, we should not deprive them of visual instruction through silent films on the plea that sound films are the only means which can deliver the goods. We should not forget that a number of instructional films have only a "running commentary" dubbed on their sound tracks. A good teacher can always give a running commentary himself, according to his own choice and taste, provided he is well equipped with teaching notes and guides supplied by the producer of a film. Technicolor Corporation 8 mm. silent projector is available for as low a price as $ 100 or less and the Fairchild Sound 8 mm. projector is likely to cost us, in underdeveloped countries, as much as $ 300 a piece. The former price is within reach of all the schools in the country, whereas the latter price is beyond the reach of even some of the middle and high schools too. One can, therefore, think of a compromise, which suggests that we may perhaps be right in recommending sound projectors to high, higher secondary schools and university colleges and silent projectors to middle and primary schools.

SOME OTHER IMPORTANT FACTORS RELATED TO THE PRODUCTION OF EQUIPMENT AND FILMS

The full potentialities of 8 mm. sound film cannot be exploited until a whole new 8 mm. system is perfected after taking into account the needs for :

(i) Quality low-cost projectors,

(ii) Quality low-cost release prints,

(iii) Inexpensive methods of making reduction prints from existing 16 mm. instructional films,

(iv) Inexpensive methods of original production in 8 mm.,

(v) Marketing and distribution set-up for 8 mm. prints, along with the consideration for the phased programme for change-over from 16 to 8 mm. system.

Equipment and film production programmes must go hand in hand, otherwise, the "egg first or the chicken first" dilemma will lead us nowhere. There are hopeful signs even in the developing countries like India, that some private industrial concerns are now eager to take up production of both projectors and instructional films or rather the reduction of existing instructional films from other countries, to 8 mm. size, in cooperation with overseas firms, provided Government extends them facilities for importing necessary machinery for the purpose. Interest for 8 mm. film has been aroused considerably since the time Technicolor Corporation's 8 mm. silent and Fairchild 8 mm. sound projectors were demonstrated in India some time ago. Compared to the present price of 16 mm. projector, the price at which 8 mm. projector is now offered is definitely low. It is only a question of time for 8 mm. film to get a firm foothold in our educational system, but if this is going to happen sometime why not start now?

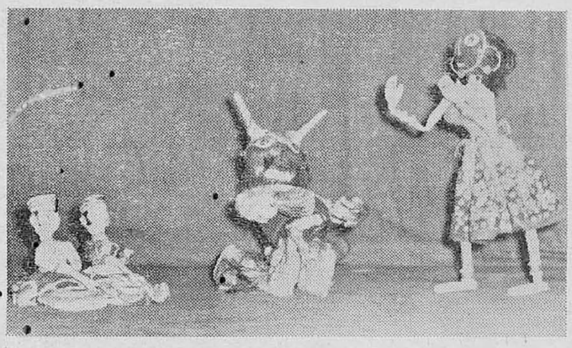
Once good quality 8 mm. projectors are made available in abundance, the demand for films would go up rapidly. Reduction from 16 mm. existing film is not likely to present as formidable an obstacle as in the case of reduction of 35 mm. to 16 mm. Attempts must, therefore be made to set up machineries to manufacture projectors and reduction prints of instructional films simultaneously. Since 8 mm. is ¼ in area of the 16 mm. frame, theoretically the print cost of 8 mm. print should also be one-fourth, but in practice this is not so, but that need not worry the consumer, as in the long run 8 mm. print life proves to be far longer than that of 16 mm. print.

Doubts and suspicions are always expressed whenever the subject of original production in 8 mm. is touched. Gone are the days of cameras with turret lenses. New 8 mm. cameras with zoom lenses can zoom from 7.5 mm. wide-angle upwards. Foolproof electric eye, and other latest gadgets like motor driven zoom lenses have made the cameraman's job an extremely pleasant experience. Dr. Edmund Middleton of University of Maryland uses 8 mm. as a teaching tool and has made films to cover surgical operations for his students. International Business Machines Organization has produced 8 mm. sound films for its training programme. Each 8 mm. edited film thus produced costs not more than $ 22. Successful 8 mm. production in sound has achieved as a teacher student participation venture in some schools in U.S.A. Further application of 8 mm. film production for TV, is to be found in the case of a reporter equipped with a Fairchild Cinephonic Camera. The black and white film is processed immediately after shooting and directly projected into the Vidicon Chain with a Fairchild projector, specially equipped with a five bladed shutter. By reversing the polarity electronically, the negative films show up positive pictures. The quality of

(*Contd. on page 23*)

D. L. SAMAR

PUPPETRY FOR SCHOOLS AND COLLEGES

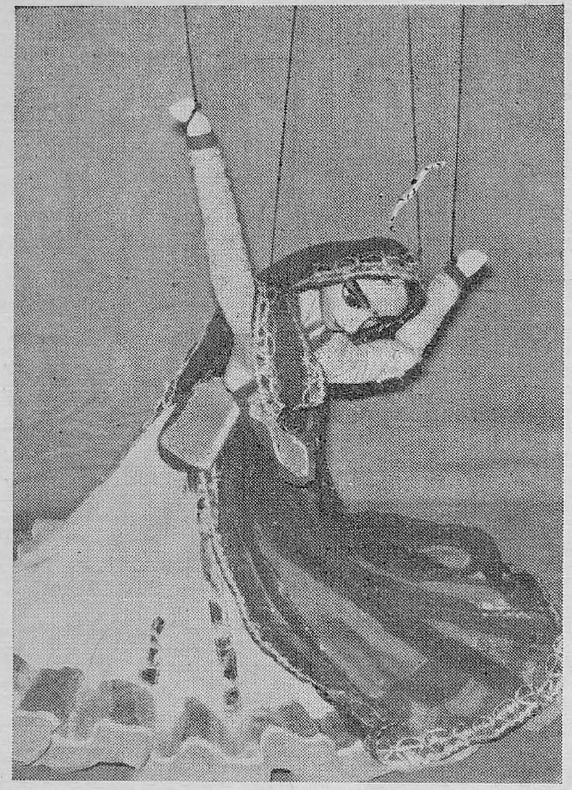


Unlike the stage actor, whose personality cannot be totally detached from the role that he portrays the puppet has an independent character and therefore its impact both on the child and on the adult is greater than that of any other art form. Its symbolic and expressive character enables the manipulator to use it as his best medium of expression. Many other faculties of the manipulator also find expression in the making, colouring, costuming and dramatising of puppets. The puppet can serve as a potential medium of education if the following conditions exist or are brought about in the educational environment.

Puppetry can find a congenial home in progressive and experimental schools, having a liberal outlook on education. A creative teacher, particularly an artist-cum-craftsman with literary and dramatic tastes, will be a suitable person to take up experiments in puppetry. If all these traits are not present in one single teacher, a coordinated effort may be made by combining the talents of several teachers. Puppetry can be taken up as an extracurricular activity, as well as an independent subject like drawing, art, crafts, music, dance etc. It should also be borne in mind that a puppet is neither a toy nor a doll nor a piece of craft. It is a character, which has to be given action, prospective and its introduction for educational work will be fruitful only if it is used as an art-form and not as a piece of craft. Puppet work should find place in schools and colleges in the following manner:

(i) As a separate hobby class: puppet carving, puppet making, colouring, costuming and production of puppet items and plays should be taken up. The art-crafts teacher, the mechanic, the technicians, the language, music, dance, drama and science teacher can play an important role in taking up such work in a coordinated manner.

Thus the child will have an opportunity of using his faculty of craftsmanship in making a puppet with ready materials like paper, waste cloth, clay, plastic etc. He will also be able to use his faculty of colour sense in designing colouring and costuming puppets. While producing a puppet play or giving a particular character, and if this work is taken up scientifically, and systematically, the child will be able to express



String Puppet

himself wonderfully well through all these mediums and learn several arts in play without the drudgery of the classroom.

(ii) It can be taken up as a project, classwise, groupwise, or schoolwise, according to different age groups. While doing so the skilful teacher, directly or indirectly, can cover a relevant part of the school curriculum in a very subtle and creative way. The creative aspect of the child should be given full scope for expression. Any project taken up under this plan will have a pre-planned scheme in consultation with the coordinating subject-teachers.

(iii) The usefulness of puppetry in schools and colleges lies in its art form. It can be taught to students just like music, dance, dramatic arts and crafts with a regular curriculum and class teaching. Besides learning the art of puppetry, several other faculties of the child will be helped as in the case of other art subjects.

The courses of puppetry for different classes may be chalked out by experts according to the physical and mental age of the students. The main outlines of the courses will be as follows :

Construction, designing, colouring, stringing, costuming, play production, manipulation, staging and presentation of puppet items. This will include speech training for synchronizing the dialogues with the puppet action. It will also include making of stage and stage decor, with easily available materials in the educational institutions and also stage lighting. In the lower age groups emphasis will be laid on rod and glove type of puppets and in the higher stages marionettes and shadow puppet can also be used.

Puppetry in the University or College Stages

(iv) Puppetry can be taken up as a regular subject at the University or College stages also. The higher teaching of puppetry will include the following aspects :

Theoretical

1. Dramaturgy of puppetry, inclusive of acting styles of puppets, expression through puppets emotional impact of puppets, stylization and symbolization in puppetry, the intellectual element in puppetry, the symbols and movements of puppets; characterization in puppets the fantastic element in puppetry.
2. Anatomy of a Puppet.
3. The technique of script writing for a puppet play.
4. The theme and play matter.
5. The dialogues and speech of puppets.
6. The puppet-dance, opera, ballet and dance-drama.
7. Stage decor, different types of stages suited to different types of puppets.
8. Direct music, and play, back ground music suited to a puppet play.
9. Principles underlying glove, rod, finger shadow puppets and marionettes.
10. Educational aspects of puppetry.
11. The history of puppets and its various forms, their development and application, in the different countries.
12. Puppetry as an audio visual aid.
13. Different media of puppet making.
14. Different styles of puppets as practised all over the world.
15. Puppetry for children, adults and delinquents.

Practical

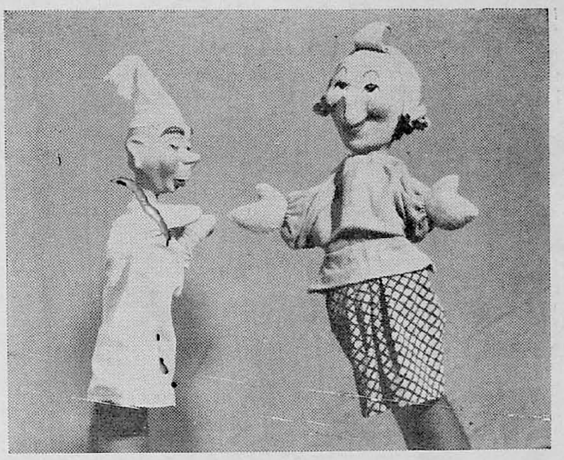
(i) Construction of puppets, through various materials such as wood, cloth paper, papier mache, clay, plastic, rubber, plaster of Paris etc.
(ii) Designing, colouring stringing, costuming of puppets.
(iii) Stage making, stage decor, lighting.
(iv) Play writing, play production.
(v) Manipulation of all styles of puppets.
(vi) Puppetry for occupational therapy.

(vii) Puppetry for mental deficients.
(viii) Puppetry for problem children.
(ix) Puppetry for physically deficient, crippled and invalids.
(x) Puppetry for psychological clinics.
(xi) Puppetry for stammerers.

Puppetry can also be taken up by all such educational institutions which do not have all the resources of an experimental or progressive institution, but which want to have an interesting activity for their students to capivate their imagination and give them a useful activity for developing their creative and imaginative faculty. In such institutions there should be one or two good arts and crafts teachers and one or two other imaginative workers to help them in producing and performing puppet characters in a playful and entertaining form.

In such classes the students will learn how to make a puppet with easy materials like paper, rags, and waste material, such as straw, wood pieces etc. They will colour and costume the puppets themselves and learn, how to prepare a simple puppet play according to their age, and present it before an audience. They will also learn how to prepare a puppet stage with the help of tables, chairs, blackboards, cots etc. which are easily available in their institutions.

Such work in resourceful institutions will enrich their activities, inculcate interest in students and draw them from all other undesirable activities. In such institutions where puppet production and puppet making, is often handicapped due to lack of resources, ready-made puppets plays prepared by experts and ready-made puppets suited to such plays can also be supplied on behalf of government so that on their basis independent work may be undertaken.



Glove Puppet

Glove Puppet

PUPPETRY FOR DIFFERENT AGE GROUPS

Puppetry in infant stages 3 to 6 years

Children should be encouraged to witness shows suited to their age and make toys and dolls with materials like plasticine, clay etc. If they so desire, they can play with them as living objects and apply their own fantasies as they generally do with ordinary toys. Puppetry should not be introduced as a formal subject at this stage.

For age group 7 to 12

Glove & Rod puppets are more suited to this group, as they are simple to make and easy, to manipulate. Their identification with the child is also more powerful and their impact on the audience is also more direct and impressive. For extra curricular activities, hobby, classes, regular class teaching, educational projects etc. fairy tales, folk legends of imaginative and fantastic nature should form the themes of puppet plays.

FOR AGE GROUP BETWEEN 12 to 78

Marionettes and shadow puppets can also be introduced in this age group. The manipulation of marionettes is more difficult, than that of other styles. For professional and realistic types of themes, marionettes are useful. Historical, and also satirical themes can be taken up at this stage. The technical aspect of puppets, such as manipulation, stage and light crafts and the presentation of the play can be emphasized at this stage.

PUPPETRY FOR PROBLEM AND DELINQUENT CHILDREN

Since this is a highly technical work, it requires men with high educational and technical qualifications with

Rod Puppet

a rich experience in this line. Such experiments require regular and well equipped clinics, staffed with psychologists, psychotherapists, educationists and competent puppeteers to handle the specialized puppets.

Since curative quality through the handling of puppets as creative art is already present and the intelligent teacher is there to help the child in resolving his or her complexes in the natural course, this highly specialized treatment may be left out.

IMPACT OF PUPPET SHOWS

Since puppets have an extraordinary impact on the audience and because of their symbolic and fantastic character, the puppet shows produce magical effects. In countries, where advanced puppetry, in all its aspects is being practised for the last 40 years; it is taken for granted that puppets can be the best teacher of the child through a well planned and well thought out play. In some countries the education or the social welfare departments maintain puppet troupes with special plays for special purposes. They go from place to place and perform according to a regular schedule. The purpose behind such shows is twofold, to provide healthy and educative entertainment to the masses and inculcate interest in them for a more useful and healthy life. *The necessity of an organization to act as a training centre in puppetry and also undertake extension services cannot be underestimated.*

For introducing puppetry for educational work, it is absolutely necessary that training facilities should be made available. The Bharatiya Lok Kala Mandal, which at present, is the only organisation in India, doing puppet work in an advanced form, may be used for the purpose. They should be able to run different duration, to suit the needs of the type of trainees.

The general outline of such courses will be as follows:

1. The course will consist of theoretical and practical work in various aspects of puppetry.
   - (a) Dramatugry of puppetry.
   - (b) Speciality of glove, rod, shadow and string puppets and their impact on children and adults.
   - (c) Puppet experiments in other parts of the world.
   - (d) Puppetry in schools, colleges and universities.
   - (e) Puppetry as distinctive drama form.
   - (f) Making, carving, colouring, costuming, stringing and manipulating of puppets with different media.
   - (g) Puppet play production, practical work, in stage decor, lighting etc.
   - (h) Script writing.
   - (i) Puppetry and its educational uses.
   - (j) Speech training.
   - (k) Music, composition and sound production.

2. This institution should also be able to arrange extension services to those schools and colleges, which are doing such experiments from time to time. They should also be able to arrange refresher courses for the teachers doing puppetry.

3. This institution should also be able to maintain a puppet troupe for going round educational institutions according to a pre-planned schedule and entertain the students and give practical hints for manipulating puppets.

4. This institution should also be able to prepare puppets, puppet sets and puppet scripts for supply to different educational institutions, which do not have facilities for doing them themselves.

J. G. MILLS

SOME NOTES ON TEACHING ENGLISH BY TELEVISION IN DELHI

Educational television plays an important part in the Delhi school system. Of the 350 Government schools in Delhi, 220 have T.V. sets and about 46,000 students are benefiting from the T.V. lessons. The Delhi T.V. Pilot Project is a co-operative enterprise in which the Directorate of Education, the AIR, the British Council and the Ford Foundation, all play a part, (the latter having provided the transmitter and the T.V. Sets). The British Council is particularly concerned with instructional television in the form of elementary English language teaching; and with teacher training.

ENGLISH BY TELEVISION

The series of English by Television lessons for class VI which started in 1963 are based on the 'Structural syllabus' prescribed by the Directorate. The structures used in the lessons follow the order of the graded syllabus as closely as possible (except when the dramatic and visual requirements of the T.V. medium require certain modifications *e.g.*, commands and questions). Each lesson presents a new structure and new vocabulary by making use of structures and vocabulary items previously taught. The vocabulary used is that most suited both to the students, backgrounds and to the dramatic needs of the television lesson. The situations are those of everyday life bearing in mind the age, experience and interest of the children. No use is made of the vernacular and no translation or grammatical explanations are given.

The English by Television lessons are transmitted on Wednesdays and Saturdays. The complete English lesson lasts for 40 minutes; this includes 5 minutes of preparation for the T.V. lesson, 15 to 20 minutes for the T.V. lesson and the remaining 15-20 minutes for the class teachers' 'follow-up'.

AUDIENCE

As far as instructional television in general is concerned, there are two types of viewers : the captive and the non-captive. A captive audience is made up of learners who attend compulsorily or voluntarily some educational institute or organisation. Its special characteristic is that it is already receiving instruction in school, as in the case of the Delhi Pilot Project. Therefore, the lessons have to be integrated into the syllabus used in the school system and are best produced locally.

A non-captive audience is made up of viewers who follow a course of T.V. lessons, probably in their own homes. There is no 'follow-up' and no 'feed back', so each lesson must stand on its own. An example of this kind of programme is the 'English by Television' series transmitted in Tehran to the general public consisting of some 5,20,000 viewers.

ELT-TV : THEORY AND PRACTICE

Generally speaking TV though perhaps the best of all audio-visual aids, should only be an aid to the teacher. It should not try to take the place of a competent teacher. The English lessons telecast to Class VI in Delhi (a captive audience) are based on this principle; they are not intended to replace live teaching in the classroom, but so be an invaluable auxiliary to it by offering something that the classroom teacher cannot offer or do so well.

Effort is made to make the TV presentation a model presentation, acting as a guide for the order of presentation of structures, for the method of presentation and for pronunciation. (In this sense the lesson incidentally serves as a means of in-service training for the teacher.)

The TV lesson, by going beyond the immediate range of classroom possibilities and illustrating a teach-

ing point in a real life situation, can enrich and enlarge the child's experience by taking him out of the class-room. The proper exploitation of the TV medium by means of films, studio sets, animated captions, puppets, models toys and illustrations etc., can take the child into the country, into the city, to the sea-side or into a world of fantasy and make believe. It thus takes into account the psychological attitudes of the viewers to TV in general and language teaching in particular.

Although TV has enormous potentialities as an audio-visual aid, a disadvantage is that it tends to create passivity. As passivity is no condition for language learning the T.V. lessons have to adopt the most suitable pattern of presentation to attract the interest and participation of the viewer/learners.

The possibilities include : (i) televising an actual classroom, (ii) televising a teacher teaching in vacuum, (iii) using exclusively cartoons, films and playlets, and (iv) televising a team presenting a simple dramatic situation which illustrates a teaching point.

The first possibility is uninteresting because it is dull to watch classroom drill where there is no opportunity for viewer participations; the second possibility gives little opportunity for meeting language in action as for the third, few suitable films and cartoons are available. The fourth possibility (*i.e.* the situational method) is the most suitable as it demonstrates language in action and, for variety, can introduce elements of the other three methods.

If the situational method is adopted two types of situations can be presented 'real life' situations and class-room situations. The 'real life' situation offers opportunity for a considerable variety of visual interest and dramatic action; consequently it can stimulate the viewer's interest and participation more than the 'class-room' situation.

The TV lessons, as presented in Delhi, make use of 'real life' situations. Several persons present a common everyday situation (*e.g.* in the park, at the zoo, at the market, a children's party, in the kitchen, at the toy shop, etc.) to demonstrate language in action. The actions are dramatic, the dramatic action in the particular context. At intervals, the TV teacher/actor talks directly to the viewers and invites them to participate.

To add visual interest, the teaching points are further illustrated by means of films, illustrations, photographs, models and captions for the reason that since a teaching point is most often verbal, the better it is visualised, the better it is remembered.

Apart from the fact that language can be taught both in the classroom and in the TV studio, the analogy can be carried no further, for TV teaching, if it is to be fully effective, relied wholly on the exploitation of visual material in conjunction with the manifold technical aspects of the TV machine.

TV is an art just as the film and the theatre are. It is an art because every picture must be as perfect as possible and be a harmonious composition.

SCRIPT WRITING

However efficient the technical presentation of a programme may be, the effectiveness of the teaching depends upon the excellence of the script, which should represent a marriage between the skill of teaching and the art of television. In fact script writing is the crux of the problem. Actor/teachers can always be found to play their parts; technicians can always be trained to handle cameras; a skilled TV producer knows how to choose and control the pictures that appear on the screen. But unless the basic scripts are satisfactory from the point of view of the linguistic content and visual conception, the programmes cannot succeed.

The teacher, script writer and producer must work closely together as a team in compiling the scripts and mounting the programmes, while at no stage must they lose sight of the audience they are aiming at.

For captive audiencies as in Delhi the syllabus has to be the controlling factor, and in order to reach a compromise between teaching methods, linguistic principles and TV techniques something has to be sacrificed. But whatever the sacrifice, it must never be forgotten that television is a visual medium and that visual interest must be paramount.

PRODUCTION, STUDIO CONDITIONS, ACTOR TEACHERS

Although script writing is of the utmost importance other equally important factors contribute to a successful TV programme.

The responsibility for the programme is in the hands of the producer. The presentation depends on the actors/teachers. The floor manager, the cameraman, the boom operator and the other studio staff, together with the vision mixer and the sound mixer in the control room, and all the other technicians responsible for the technical aspects of the recording and transmissions, play their part in the production.

When TV programmes are for the purpose of instruction rather than entertainment it is essential for each teaching point to be clearly presented; for this purpose a professional teacher who can act often proves to be more suitable than a professional actor without teaching experience.

(*continued on page 15*)

B. R. SAGAR

MULTIPURPOSE DISPLAY BOARDS

Bulletin Boards or Display Boards being used in schools and colleges, are normally of two types. One kind is of those which are of ordinary wood or ply-wood, covered with flannel or any other type of cloth. But these cannot be considered very useful from practical point of view, as it is somewhat difficult to fix a pin in the hardwood just with thumb pressure. The pins are to be driven into it. For putting up some sort of permanent material, these boards serve a useful purpose since the pins once driven in, are difficult to pull out. Generally, such boards prove better for use in offices where statistical graphs, time tables, syllabii etc. are to be displayed more or less permanently. The second type of Display Boards are made of Cellotex or Sitatex boards. These provide the facility of fixing any piece of paper on the board with the help of drawing pins which can be easily driven into the soft surface. The material can be taken off these boards and replaced at will. However, these boards have the following drawbacks :

(i) They are costly.

(ii) When pins are taken out, small holes are left behind. After constant use numerous tiny holes on the surface present a bad look.

(iii) Constant use reduces the catching capacity of the surface and the pins cannot remain fixed tightly.

(iv) Fixing up picture, photographs etc. with the help of drawing pins involves piercing of holes in the displayed material. This results in spoiling the look of pictures especially the photographs.

(v) Drawing pins are liable to be removed by students. To tide over this situation the Punjab State Audio Visual Education and Film Library, Chandigarh has, after careful thought and study, developed a hitherto untried but easily available material for use as Display Boards in schools, colleges and offices.

We have named these boards as Multipurpose Boards because these are supposed to serve more than one purpose.

Some definite advantages of these Boards are :

(i) They are low cost.

(ii) Preparation is easy.

(iii) The material is easily available in the market.

(iv) They are very durable.

(v) Displaying in no way spoils the material displayed, nor any holes are made in it.

(vi) Background of any colour suiting to the material to be displayed can be had easily.

1. PERFORATED HARD BOARD

Hard board of two kinds is available in the market. One is ordinary hard board and the other is hard board in which holes have been punched. Latter type of hard board is popularly known as "Perforated Hard Board". It is available in pieces of 2'×2' and is priced at between 65 to 75 paise per square foot. As compared to other types of boards the material is very cheap.

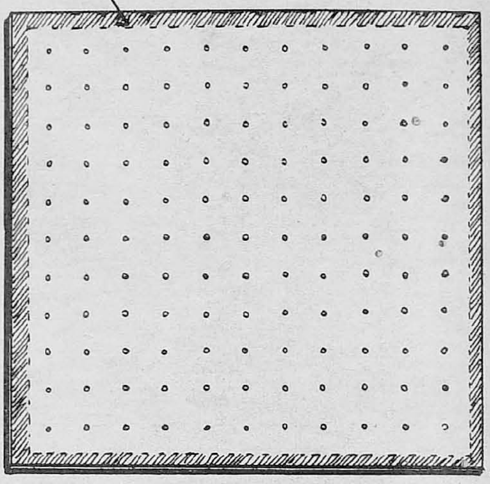
2. 1" THICK AND ½" WIDE LONG PIECES OF ORDINARY WOOD

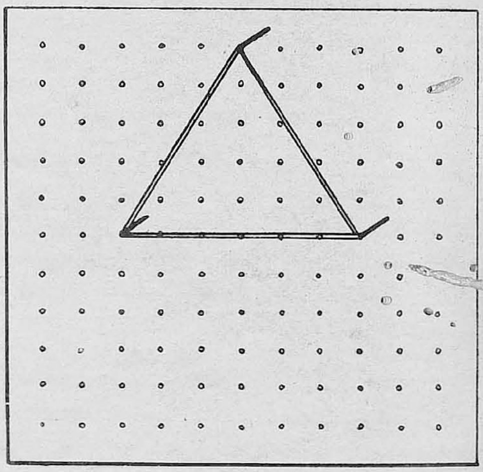
These pieces are meant for framing. As the farming is to be done on the back side only, there is no need of using very smooth and polished wood. Ordinary wooden pieces would do.

3. A few ½" long nails.
4. A little enamel paint of desired colour.
5. Ordinary hair pins.

CONSTRUCTION

Frame the back side of hard board piece and give the front side two coats of enamel paint of desired colour. When dry, the board may be hung against the wall supported by two nails fixed in the wall. The frame will not only help in supporting the board on the nails but also keep the board projected from the wall. The board can be taken off the nails and placed in position whenever required.





USES

1. AS DISPLAY BOARDS

Pieces of paper cuttings, pictures and even card board pieces required to be displayed may be fixed on the board with the help of curved ordinary hair pins. straight hair pins are given a curve with the help of a plier in such a manner that the pronged side of the curve is longer than the closed end side. The prongs are inserted into two adjoining holes and the closed end helps in fixing the displayed material on the Multiple Board. It is presumed that deformed hair pins, being of no use to the students, will not be taken away. To prepare bigger boards number of perforated hard board pieces can be joined together and put to use.

2. FOR TEACHING AND DRAWING GRAPHS

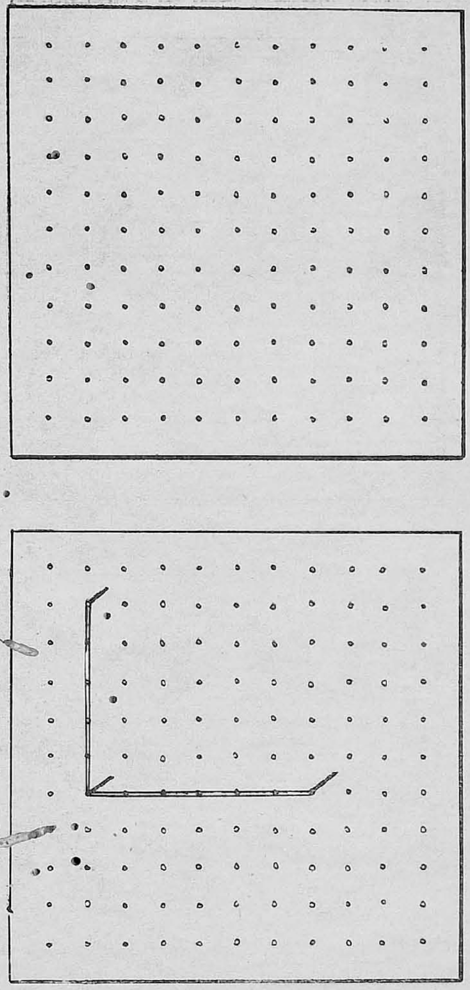
In these boards the perforations are symmetrical and at regular distances. By using a bit of his wits a Mathematics teacher can make a very good use of perforated boards for teaching graphs to the students. For locating, fixing and reading points, small, coloured, plastic pegs fitting well in the holes are very useful (No. 7 plastic knitting needles may be cut into pieces to form pegs). So much so that even line graphs and bar graphs can be beautifully illustrated.

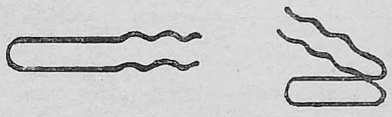
3. FOR GIVING CONCEPT OF GEOMETRICAL FIGURES

Idea of geometrical figures like triangles (various kinds) quadrilaterals (various types i.e. square, rectangle, rhombus, kite, trapezium etc.), pentagon, hexagon etc. can be given very effectively by making use of a few pegs and a coloured ribbon or thread.

4. FOR TEACHING ARITHMETIC TO ELEMENTARY CLASSES

Give the first grade students each a perforated hard board piece of 1'×6" framed on the back. Supply the tiny tots a set of coloured plastic pegs. Ask the children to follow what is done by the teacher on a





bigger piece of Multiple Board hanging against the wall. The teacher will go on inserting coloured pegs. He will go on putting questions about the colour and number of pegs at the same time watching that the students are following the activity on their own perforated slates.

An intelligent teacher can, however, develop a highly effective technique for teaching the following skills.

(i) Teaching about colours
(ii) Teaching about numbers
(iii) Teaching about addition
(iv) Teaching about multiplication
(vi) Teaching about division
(vii) Teaching about brackets
(viii) Teaching about geometrical figures
(x) Teaching about graphs.

This method develops hand dexterity of children. It provides an interesting activity for the students and an opportunity of learning while doing.

(*continued from page 12*)

TEACHER'S GUIDES

In the case of a captive school audience (as in Delhi), it is essential for the television teacher to keep in the closest touch with the classroom teachers and students by means of supporting literature and, if possible, by personal visits to the schools to help the teachers practically. *Teacher's Guides* accompanying the TV course are necessary in order to help the teachers to carry out the proper follow-up of the TV lesson.

Teacher's Guides are issued to each Class VI teacher of English: they give detailed instructions regarding the content of the TV lesson (including structures and vocabulary taught), the preparation and follow-up to be carried out by the classroom teacher, such *Guides* enable the teachers and students to be prepared for the TV lesson and to revise it afterwards. The *Guides* include a list of structures and vocabulary items taught in each lesson and suggestions for exercise in and practice of what has been taught; they list words whose pronunciation is especially difficult; and they also tell what the TV lesson is about and how best to prepare for it.

Apart from these *Guides,* AIR issued each year a 'School Television' booklet giving the out-line of the TV syllabus in relation to the classroom work.

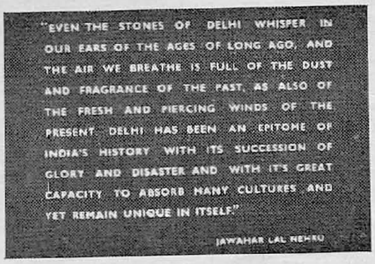
TV NEWSLETTER

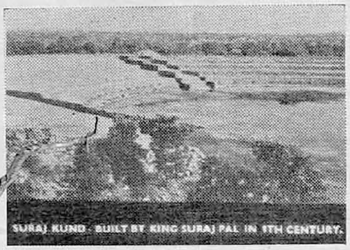
A TV Newsletter is published every month by AIR and sent to the schools. This contains articles on educational television in Delhi. It gives suggestions to teachers and also asks for their criticisms and comments. It is, therefore, helpful in creating a better understanding between those who produce the lessons and those who view them.

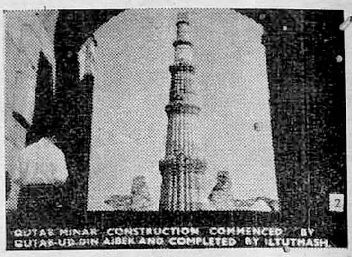
TEACHER TRAINING

In order to help orientate teachers towards TV as a new medium of instruction and towards the proper use of the 'Structural approach', special seminars and group meetings of teachers are held regularly.

Although the TV lessons serve as incidental in-service training for teachers, special programmes for teachers are transmitted to reinforce the impact of the seminars.




SURAJ KUND - BUILT BY KING SURAJ PAL IN 9TH CENTURY.



QUTAB MINAR CONSTRUCTION COMMENCED BY QUTAB-UD-DIN AIBEK AND COMPLETED BY ILTUTMASH.

OUR FILMSTRIPS

HISTORICAL MONUMENTS OF DELHI

A filmstrip produced by The National Institute of Audio Visual Education

One of the important functions of the National Institute of Audio Visual Education is to produce projected and non-projected aids for class-room instruction. Production of filmstrips is part of this function. Through the medium of this journal we propose to bring to the notice of our readers some of the filmstrips produced by the Institute. In this issue we have reproduced *most of the frames* from the filmstrip "Historical Monuments of Delhi". The filmstrip received the "Certificate of Merit" from the Government of India for the year 1963-64.

In this filmstrip, an effort has been made to trace the history of those monuments which are significant from the point of view of history and architecture.

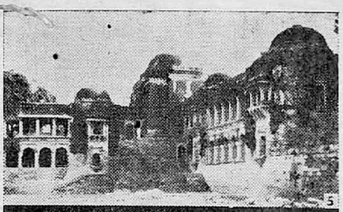
For details regarding this and other filmstrips, readers may write to the Director, National Institute of Audio Visual Education, Indraprastha Estate, Ring Road, New Delhi.

—EDITOR

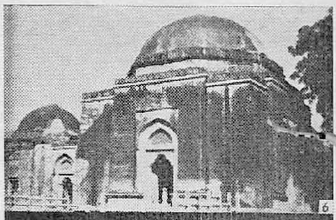
DIWAN-E-KHAS - HALL OF SPECIAL AUDIENCE WHERE ONCE STOOD THE FAMOUS PEACOCK THRONE.

SAFDAR JUNG'S TOMB - LAST GREAT MOGHUL MONUMENT BUILT IN THE MEMORY OF SAFDAR JUNG.

JANTAR MANTAR - BUILT BY MAHARAJA JAI SINGH II, OF JAIPUR.

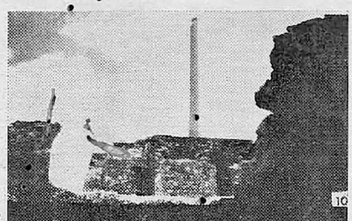


HAUZ KHAS BUILT BY ALA-UD-DIN KHILJI IN 1295 A.D.



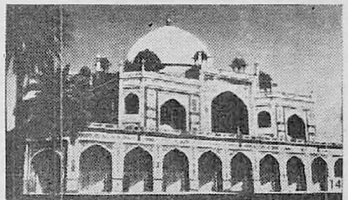
FEROZE SHAH'S TOMB—BUILT BY NASIR-UD-DIN TUGHLAK SHAH.

GHIAS-UD-DIN TUGHLAQ'S TOMB—SIMPLE AND AUSTERE IN SHAPE AND SIZE.

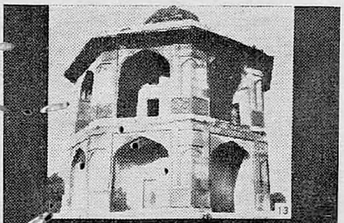


ASOKA PILLAR—RE-INSTALLED AT KOTLA FEROZE SHAH BY FEROZE SHAH

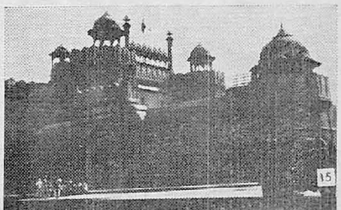
PURANA QILA - FORTRESS PALACE BUILT MOSTLY BY SHER SHAH SURI.



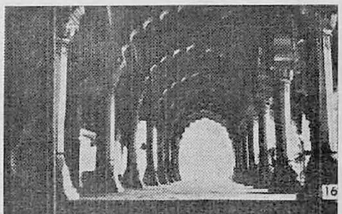
HUMAYUN'S TOMB - MARKED THE BEGINNING OF A NEW SERIES OF SPLENDID BUILDINGS.



SHER MANDAL - BUILT BY SHER SHAH AND LATER USED BY HUMAYUN AS LIBRARY.

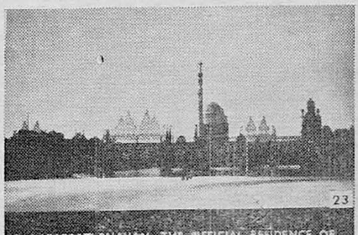


RED FORT - BUILT BY EMPEROR SHAH JEHAN.

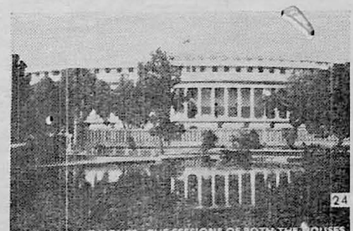


DIWAN-E-AAM - HALL OF PUBLIC AUDIENCE.

CENTRAL SECRETARIAT BUILDINGS IDENTICAL IN DESIGN AND SYMMETRICAL IN APPEARANCE



RASHTARPATI BHAVAN THE OFFICIAL RESIDENCE OF THE PRESIDENT OF INDIA



PARLIAMENT HOUSE THE SESSIONS OF BOTH THE HOUSES OF PARLIAMENT ARE HELD HERE.

HOW TO MAKE IT YOURSELF NO—.16

PREPARING AND USING GRAPHIC STRIPS

WHAT IS A GRAPHIC STRIP ?

A graphic strip is a long narrow strip or scroll of paper with either a story, a concept, a process or a situation portrayed graphically on it through illustrations or sketches, in a series of steps or frames. When unrolled, this strip will provide a continuous moving glance over the whole of the illustrated matter. This experimental aid, being developed at the Institute, has manifold possibilities of being used effectively as an inexpensive teaching tool. It has some of the basic features of its modern sisters, films and filmstrips. When used as a projected aid, with the help of an opaque projector, it unfolds the subject serially in progressive steps as a filmstrip does. By using cut-outs, even motion can be introduced against projected frames. It can be easily made without undergoing the different stages of photographic production and without using costly equipment.

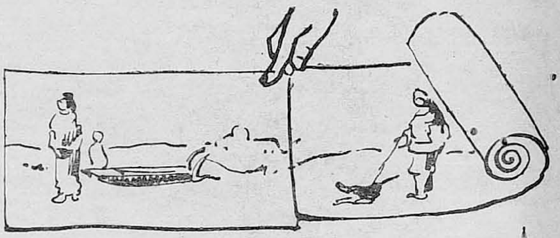


Fig. 1

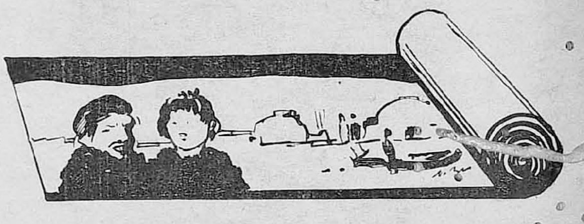


Fig. 2

HOW TO MAKE IT ?

A graphic strip creates maximum impact when used with an opaque projector or episcope, more popularly known as epidiascope. Thus its dimensions are generally controlled by this equipment. A convenient size for a frame of the strip is 7″ by 9″. This is prepared out of thin sheets of cartridge paper or cover or chart paper, which are normally available in 22″ by 28″ size. One sheet cut evenly into three strips along the 22″ size will give 9 frames. Two such sheets will give 18 frames. Generally 15 to 18 frames are sufficient for a graphic strip.

All curricular subjects lend themselves easily to elucidation through this medium. Decide upon a theme or concept to be depicted and divide it into 15 to 18 progressive steps. Plan rough sketches to illustrate these steps. Develop a script that will serve as study guide or teaching notes for the strip. Finally prepare suitable fair illustrations.

Since the size of the frame can be made to correspond to the normal size of the pages of printed matter, so you can trace and colour the illustrations from the source materials, frame by frame. Join the edges of the frames, overlapping one another, by means of thick glue. Wet mount the roll of paper on some thin cloth or preferably 'muslin'. Trim the edges evenly and roll it in the form of a scroll. (See fig. Nos. 1 & 2).

HOW TO USE IT ?

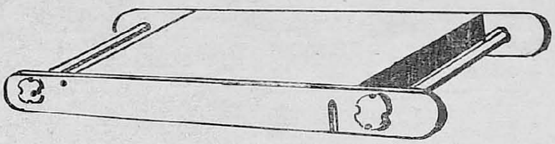
The graphic strip is a multipurpose teaching aid. It attarcts attention and conveys the meaning clearly. It can be used with an equipment or without it.

(i) *Using the strip with an opaque projector*

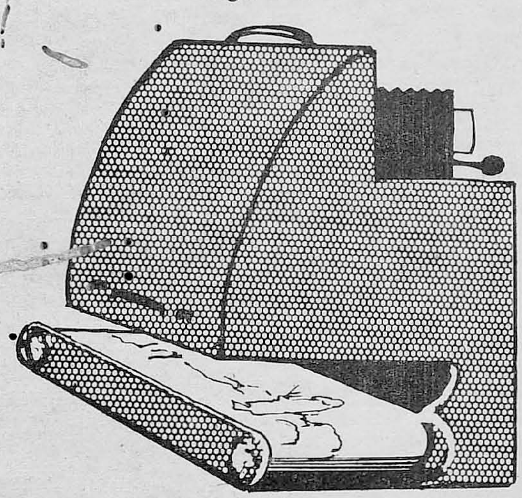
One end of the strip can be flattened out and placed on the platen or bed plate of the projector. It can be slowly unrolled by pulling it out at this end. The images get projected simultaneously and the movement of images on the screen attract attention. A wooden projection frame with rollers can be placed on the platen in order to produce smooth movement. In order to develop synthetic audio-visual experiences, it is necessary to tape record a commentary based

PREPARING AND USING GRAPHIC STRIPS

upon the script, to be used at the time of projection. (See fig. Nos. 3 & 4).



Figs. 3 & 4



(ii) *Using the strip with a scroll box or stand*

This can be fixed in a scroll box or stand and the different frames can be rolled out for viewing. (See fig. No. 5).

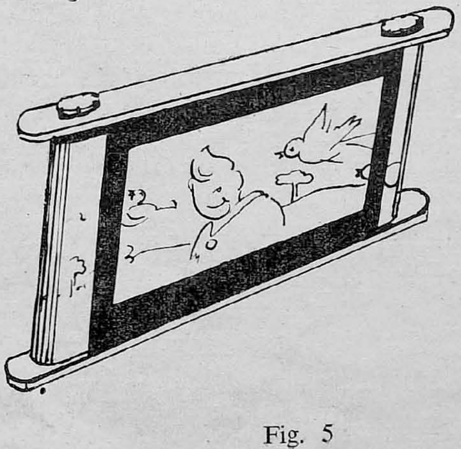


Fig. 5

(iii) *Displaying it on a table or a stand*

The entire strip can be rolled out and displayed on tables or vertical stands. The teacher and the pupils can use it as a tool for group viewing and group discussion. See fig. No. 6.

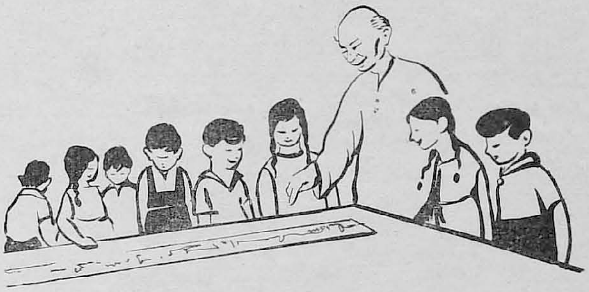


Fig. 6

(iv) *Using the strip as an auto-instructional aid.*

Students can handle the graphic strip independently and relate the script to the illustrations in order to visualize the whole idea properly. (See fig. No. 7).

A teacher with his imagination, ingenuity and resources can develop a library of strips. This inexpensive medium opens up new possibilities of the use of the graphic strip as an instructional aid.

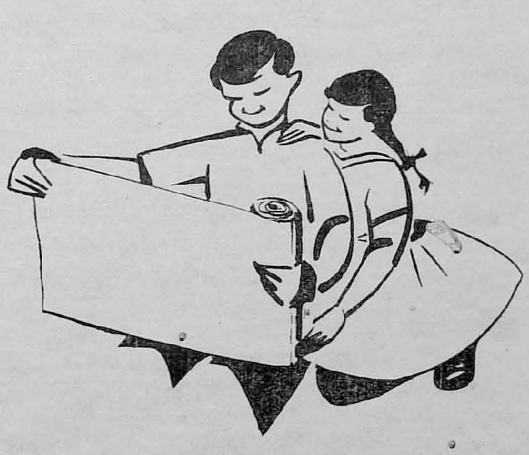


Fig. 7

V. D. MISHRA

Programmed Instruction

The teaching machines and programmed instruction are the latest American innovations in the field of education and may in course of time prove to be the greatest since the invention of printing. Both combined appear to possess the poteniality of solving the greatest of all educational problems of modern times that of "too little time to teach so much, so many to teach with so few qualified teachers" and that too by enabling each student to determine his own pace. The teaching machine with its programme opens the way to treat each student as he really is : as an individual. No longer he must be forced into one *rigid lock-step* with the rest of the class. If he is gifted he can be educated fast, if he is slow he can be educated slowly and well. The student of the future need not be allowed to become retarded nor pulled up in the presence of a number of other pupils in the class. These new developments then seem capable of solving the problem of making instruction both universal and individual. And the truly wonderful thing about the machine is that the student regardless of his ability learns faster and better than he does by conventional methods of teaching. Dr. Benjamin Fine in his experiments with Teaching Machines found out that the rate of failures in a medical technology class had dropped from 12 per cent to 3 per cent after the teaching machines were introduced, the percentage of A & B students rose from fifty to eighty five and the students completed the course in 30 rather than the usual 120 hours. Astounding achievements indeed ! These machines ranging from simple boxes with gears, knobs and openings for questions and answers to electronic devices wired for light and sound present a task to the pupil. This task can be a problem in arithmetic, a word to be spelled, a choice among three or four forms of a sentence or completion of a map. Usually the wrong answer keeps the pupil at the old task or directs him to finding out where he went wrong, the right answer is immediately reinforced and is followed by a new task. This reinforcement or reward need not necessarily be confined to the prosaic 'That is correct proceed to the next problem'. It may be accomplished with some explanation and elaboration or else 'for the young a comic book, a lollipop or a brace of tickets for the movies could be served at strategic moments', and no less ingenious rewards could easily be contrived for the more mature learners as well.

The machines in themselves are nothing more than devices to present the learning materials to the pupils, these materials are being arranged in a different manner than the conventional text books. The material is so planned as to make it possible for the student to teach himself and at his own pace. It is this aspect of the movement that is of some relevance to

PROMISE AND PARADOX

us because even with our most ardent enthusiasm to introduce the latest in our schemes of education it may not be possible for us to manufacture or import these gadgets in the near future. Besides, the mechanical gadgets would be nothing better than useless hardware or toys without a sound and worthwhile scheme of instruction that is fed into them. This graduated information is known as the programme and hence the instruction provided by these machines or with the help of a textbook that has been written on the pattern of this technique of instruction is called programmed instruction. Spreading of the distinctive quality and rationale of programmed learning, Eugene Galanter of the University of Pennsylvania says, "Programmed Instruction is simply a new, better way of writing a textbook. Our conventional narrative prose is a fine medium for expressing action and emotion, but it is an inefficient way to present information or concepts to be learned. That is why our novels read better than our textbooks. People learn to take in information not from a printed page but by responding to stimuli. Thus the new textbook begins not with a declarative sentence but with a question".

Usually the questions in the beginning are about things which are familiar to the student, then through a sequence of such questions he is gradually led to new usages, concepts and insights. In the process, he learns new definitions and learns to recognize and understand the governing laws, rules of principles. He does not merely memorize these : he is led to formulate them on his own, step by step. Once he has formulated such laws, rules and principles, he is immediately led to use and apply them in different contexts until he knows them thoroughly. Whatever form a programme may assume it must provide three basic aids to the assimilation and retention of knowledge.

1. It requires continuous and active student response at moments when student interest and curiosity are highest in order to practise and test each step to be learned. This is provided through questions which must be answered before the student moves on to new material.

2. It supplies immediate confirmation or correction again at the moment when student interest is highest, thus leading the student directly to a correction of his errors.

3. The student himself determines his pace of learning as he operates the programme. This permits him to move as rapidly or slowly as his interest and comprehension levels require.

As at present there are two main schools of thought in programming and although today they appear to be

at variance, subsequently it may be found convenient to consider them as complementary.

(a) The first school follows the extrinsic or linear programming of Dr. Stinner in which the progressive sequence is unalternable and identical for every student. The subject is organised into multi-step hierarchical form and the student is taken almost by the hand and led through the programme. Each step presents only that material which the student is prepared to receive. It minimises the possibility of failure and more the success, more is the motivation to continue learning. Stinner's formula is :

'High frequency of reinforcement (reward) lowers the aversive consequences of being wrong'. To maxmize success, a series of clues, hints or prompts are introduced which lead the student straight to the correct answer. At first the prompts lead the students to material from common knowledge that he is already presumed to possess. These are called Thomatic prompts and may include use of opposite and analogies, rhyme or partial presentation of words. As learning process continues the number of prompts decreases, fading until they vanish and the student is forced to begin thinking creatively and to rely much more upon himself. In this programme the student does not choose from a number of responses but is forced to construct his own response.

(b) The second school is that of Norman Cowder and Sidney L. Pressey. This programme makes use of multiple choice answers and built-in alternate sequences of items for extra bright or slow student. If a student makes a single or a number of wrong responses he is led through an alternate sequence of steps to give him remedial practice and new explanations of concept, he cannot immediately grasp. But if the student demonstrates by a series of correct responses that he has quickly grasped the material, he may be presented with additional material on the same subject. This is called branching and the technique allows the dull students to have extra practice and saves the bright ones from unnecessary explanation and elaboration. It utilizes the 'wash back' method for the dull and 'washahead' for the bright.

Underlying the whole movement of programmed instruction is the behaviourist psychology of learning as developed by Dr. Skinner. According to this psychology learning is most efficient :

(i) When the lessons are so arranged as to minimize the number of errors made by the student so as to make learning enjoyable.

(ii) When the students are given an opportunity to learn that their answer is correct this reward or reinforcement stimulates them to do better work, and

(iii) When the students learn at their own pace without being retarded or pulled ahead by the presence of other students in the class. Errorless learning, immediate re-inforcement and the freedom of every student to learn at his own pace then are the prime goals of this new psychology of learning and the programmed instruction tries to achieve them first by providing single units of information in one frame, by keeping short mental distance between frames and by using questions and answers to string frames together. Repetion, cueing, use of vanishing stimuli are some of the tactics used to ensure maximum number of correct responses from the students. The second goal, that of the immediate reinforcement is provided to the student by so arranging the answers that just after putting down his response the student gets the opportunity to confirm his answer. He has no longer to take a test after a week or a month, then wait for a few days to find out his performance. The arrangement of information in small steps of "frames" and the branching technique adopted in the Cowder texts allow each student to proceed at his own pace.

How far is this new psychology of errorless learning, that underlines the whole movement of programmed instruction, adequate? This is for the psychologists to determine but there seems to be much truth in the statement that one learns through mistakes as well. As regards the advantages of immediate reinforcement Dr. Ernst. R. Hilgard is of the opinion that "students who are highly anxious about their work perform better if they are not told how they are doing." It has been accepted by even the most over-zealous sellers of the idea of programmed instruction. (I have Dr. Benjamin Fine in mind) that the efficacy of errorless learning and immediate reinforcement is still a matter of controversy. The structure of programmed learning too is a matter of debate and people even in America are raising questions like : should learning be as errorless as possible or can it profit from a certain amount of mistakes? Should all responses be constructed by the student or will he learn just as well through multiple-choice selection? By breaking instruction down into very small steps, will we produce logical thinkers or un-imaginative ones who are unable to grasp ideas in their entirety? Does immediate reinforcement strengthen learning or rob it of discipline? Is a student really engaged in learning process when he is actually limited to making one word or one sentence answers?

Speaking with an eye on our own resources and conditions a good programme is prohibited to us by

its very cost. As yet, we have not been able to produce errorless attractive and standard textbooks of the conventional pattern. Will it not be too much for us to plan producing programme textbooks? A good programme according to Dr. Benjamin Fine (*Teaching Machines*) can cost as much as 75,000 dollars (over $3\frac{1}{2}$ lakh rupees). It would be a luxury beyond our means and poor programmes would cause more extensive damage than poor teachers.

The educational out-come of such a technique of education which has not been given sufficient trial may prove appalling in the long run. It is likely to produce a generation of educated persons who can only read or write on dotted lines, fill only gaps in sentences or make choice out of a few given alternatives. A generation taught on the pattern of programmed instruction will find it difficult to decipher the writings of past and present masters unless they have been processed into the pattern of programmed books. It would only aggravate the situation in which modern man is finding himself as a result of the breakdown of tradition, which formerly bridged the gap between the past and future.

The versatility of programmed instruction remains doubtful in spite of Dr. Skinner's assertion that anything that can be verbalized can be programmed and taught by the teaching machine. It might be found useful in teaching the basic tool subject, language, mathematics, and science but an appreciation of literature, an insight into values can hardly be taught by this technique. The technique can handle facts but cannot teach imagination, emotional and artistic sensivity nor can it develop a programme to help a student memorize a long poem. But he is yet to find out a programme which will teach a student to enjoy poetry. Kenneth Komaski, Director of the Centre for Programmed Instruction inadvertently points to the short comings of programmed instruction when he says that no method of instruction teaches a person how to write or think creatively for such things depend on far more subtle processes than accumulation and practice. Programmed instruction can teach a person mathematics; it can teach him economics; but it cannot be guaranteed that he will not cheat on his income tax." Komaski's last sentence expresses in a nutshell the paradox of programmed instruction. It makes instruction and learning easier, faster but is incapable of looking after education. Hannah Ardent in her essy on the *Crisis in Education* has succintly pointed out that "one can quite easily teach without educating, and one can go on learning to the end of one's days without for that reason being educated". This very much seems to be the case with programmed learning. But we have long left the stage when education and instruction were considered to be synonyms.

(*Continued from page 6*)

pictures is claimed to be often better than that of the 16 mm. variety.

I have taken the liberty of quoting the above three examples from the most interesting article, "The Slow, Sure Triumph of 8 mm." which appeared in June 1962 issue of "Popular Photography". The editor has concluded the article with the following words :

"We see 8 mm. as the most promising means of communication ever developed by man. In sight, sound and motion, it can transmit more information in more digestible form than the written word. Its potentialities dwarf, by far, those of television, for all its mushroom growth. *TV can't differentiate its audience on the basis of education, vocation, culture, interest, etc. It lumps everyone together; 8 mm. on the other hand, offers selectivity.* It is not economically essential that a single subject should be simultaneously seen by millions, or even thousands. It can instantly respond to individual needs, in education sales performance recording, expression, motion, analysis, exploration.

"Todays world is shrunken; it is a truism that there isn't an ocean that can't be crossed in a few hours. But there are oceans no ships or planes can traverse : differences among cultures, customs, attitudes, beliefs, points of view. These are chasms that 8 mm. can bridge and amateurs sprinkled throughout the world, can be of inestimable help here, just by observing and recording. Even the filmsiest family movie may well be an important social document to another culture. We are confident that one day 8 mm. will form a worldwide network of understanding, thanks to its economy and universality. "8 *mm. may be a small film, but its eyes are big*".

Whatever the handicaps we may suffer in the initial stages of developing 8 mm. system in educational programmes the fact is that 8 mm. film has come to stay and stay, it must. The author of the above article is fully justified in saying that 8 mm. is going to throw even TV into background so far as educational application of the two mediums are concerned. Some 15 years ago, 16 mm. films promised overall change in the educational systems of the world and people were enamoured by the promise which did not fructify, simply because at the time nobody foresaw the enormous growth of the thirst for knowledge through direct filmic evidence which demanded quick and ready supply of films from the Central and few Regional Film Libraries, which in the long run could not keep up the supply position on par with the demand. With 16 mm. films it was impossible to think of building up one's own film library even of basic instructional films in the individual educational institutions. Not

only the low price level but the smaller storing space required by 8 mm. films also has raised the hope of enabling an individual educational institution to build up its own film library of basic instructional films, which will be constantly in demand for classrooms.

The success or failure of 8 mm. films in education will largely depend upon the print cost, which should eventually be brought down as much nearer as possible to the cost of raw material and the production expenditure evenly distributed over the total number of prints. There is bound to be some time lag between the time when 8 mm. is adopted for instructional use and the establishment of ideal conditions when individual educational institutions start building up their own 8 mm. film libraries. Production cost of motion pictures will not be lower merely because of the smaller size of the release prints. Reduced cost of film stock for making prints is, therefore, not going to affect the production cost and this constant form of production cost will be considered insignificant only when large market for release prints is built up. This means decentralisation of present system of Central and Regional Film Libraries. In spite of the high cost of 16 mm. prints, there is a tendency on the part of some larger educational and industrial organisations to maintain small film libraries of instructional films constantly required by them for their own specific training programmes. There are therefore strong indications that many more educational institutions which have no film libraries of their own would come forward to start building them with 8 mm. films. Once this trigger strikes, a chain of individual small scale film libraries would start making their appearances. This in turn is bound to contribute towards lowering of print cost since the production cost would be spread over a larger number of release prints. As a result of this decentralization of Central and Regional Film Libraries would be inevitable. Further more, some schools would be in a position even to keep a few basic instructional films in the classroom itself. The challenging question is then, can 8 mm. be an agent for changing the borrowing system to a pattern built around the classroom film library?

8 MM. AND CLASSROOM FILM LIBRARIES

A very revealing paper was presented by Steve Kundsen of Iowa State University at the SMPTE Society's Convention in May 1961 on this subject of Classroom Film Libraries and financial implications involved. He summarised his paper in the following words :

"A pattern of utilization of educational film based on a classroom film library is much more feasible with 8 mm. than with 16 mm. But 8 mm. does not guarantee in itself, that a classroom film library pattern will develop. There are collateral requirements which must be met—requirements in terms of film design and of making the educators aware of the possibilities. Organized effort is needed and can do much at this stage of development".

Dr. Kundsen has given a succinct analysis of the cost account involved in equipping the U.S. Schools with 8 mm. classroom film libraries, comparing the present state of 16 mm. film usage with the prognostic set-up of the 8 mm. classroom libraries. What is happening or is likely to happen in the U.S.A. is not strictly indicative of the turn of events which will take place in other countries of the world especially those which are still in the developing stage. Yet it is reasonable to assume that the change in the Audio Visual Aids Department in U.S.A. will certainly have some repercussion on the way in which other countries would evolve their own pattern of education through 8 mm. films.

The author of this paper had an opportunity to study the utilizational aspects of at least two major countries of the East namely his own country India and another progressive and developing country Thailand, as Unesco Specialist in that country for about three years. Central film libraries exist in both countries and almost identical conditions are obtained regarding the use of films in educational institutions. It will therefore be worth-while presenting a case study of one of these countries to give some idea about the future prospects of audio visual education through films in developing countries. As at present the author is directly concerned with his own country, the Indian set-up is taken up for consideration.

16 mm. projectors in use at present in university colleges are not more than 40 at the most, the University Film Council, which is responsible for arranging programmes of University Film Clubs have only 32 members on their list. These projectors are not used for regular instructional work. They are merely used for week-end screenings of film classics for film appreciation groups of university students. As yet the question of using films for instructional purposes in university colleges is not taken up seriously, on the ground that equipment cost of 16 mm. projector does not permit the introduction of instruction through films. However, it is almost certain that if the 8 mm. experiments are successful in projecting films for audience of about 100 and odd, almost all university colleges will go in for both projecting equipment and small 8 mm. film libraries of their own. In all there are 60 universities in India, with 2,043 affiliated colleges working under them.

As it has been already mentioned earlier, only about 1,500 16 mm. projectors are in use for instructional purposes in high and higher secondary schools which number 17,2117. So there is a potential market for

over 15,000 projectors, if the prices of equipment are brought down within the reach of these large number of schools which are eager to introduce educational films for teaching purposes.

Primary and middle schools have been completely neglected from the programme of A.V. Instruction through films. About 50,000 middle schools (49.699 to be exact—1962 figures) would like to use films, which they could not do before, for want of adequate funds. These schools with all the existing primary schools numbering over 300,000 would be well advised to use 8 mm. silent projectors of Technicolor Corporation cartridge type machines. The number of primary schools is increasing rapidly since primary education is being made compulsory in all the states of the Indian Union.

So far as secondary and middle schools are concerned the school authorities will not grudge a little extra expenditure on 8 mm. projectors and films, when they are made available for less than half the amount required for 16 mm. variety.

It will thus be seen that our university colleges would require about 2,000 sound projectors and secondary schools about 15,000 making a total of 17,000 machines. If the supply line of 8 mm. sound projectors is maintained at 2,000 projectors per year, it will take more than 8 years to provide all the institutions with the projecting equipment. As suggested before, if we decide upon introducing only 8 mm. silent projectors in all the middle schools, 50,000 projectors will be required by them. Again, even if 5,000 silent projectors are either manufactured or imported per year, not less than 10 years will be required to provide them all with silent machines. Similarly primary schools will also take another 60 years at the same rate of supply. The position is not very encouraging. Unless arrangements are made to import or manufacture in collaboration with the U.S. manufacturers concerned, at least 10,000 per year of each of the sound and silent 8 mm. projectors, it will not be possible to launch the programme of instruction through films in right earnest.

Secondly it must be borne in mind that those who have 16 mm. equipment cannot be ignored for some considerable time. The 16 mm. film libraries will still function and some educational institutions, social education centres and mobile cinema units catering to large audiences would need 16 mm. all the time. Therefore the Central and Regional Film Libraries will continue their work under less pressure due to reduction of demand for 16 mm. films from schools, but they too will be required to add 8 mm. films to their film stock for loaning out material which cannot come under classroom instructional type. Judicious planning, liberalised import policy, tolerance to changing pattern of educational requirements and desire to keep up with time for the good of the younger generation are some of the factors which deserve due consideration from the authorities concerned while planning the future policy of audio visual education through films.

It is true that audio visual educational needs differ considerably in different countries but in due course of time a certain amount of uniform pattern is bound to evolve owing to the increased rate of diffusion of ideas throughout the world. The difficulties faced in India are somewhat typical of those faced in most of the South East Asian countries and perhaps elsewhere in Africa and Latin America. How far industry will help us to achieve our targets by accelerating production and keeping the price level low, is yet to be seen.

THE NEW 8 MM. "CONCEPT FILMS"

The Technicolor 8 mm. projector with built-in rear projection screen and cartridge or cassette loading films is ideally suited for classroom projection of what are known as "Concept films" of 2 to 3 minute's duration. A difficult to arrange demonstration of scientific phenomenon once arranged properly can be permanently recorded on the 8 mm. film for repeated use to fix up the concept in the minds of the students. For example, the concept of waves built up on the mercury surface with the help of vibrating tuning-fork, transverse and longitudinal waves demonstrated with metal springs, round balls fixed on vertical rods etc. are demonstrated through a short film of 2 to 3 minutes screening time with the loop film which can be repeatedly shown if necessary. Such concept films have been found extremely useful by Science teachers to introduce the subject on hand, Physics Chemistry, Biology and so forth. Live action films to show various movements of animals, their habitat, microspic animals and their ways of behaviour, etc. give splendid opportunity for students to learn biological phenomena very realistically. Action of heart, circulation of blood and similar internal working of organs are shown with animated drawings. Such concepts do not require longer time to study and hence the need for so-called "Concept Films" which come in handy plastic cassettes and can be used indefinitely without deterioration. It is possible for teachers themselves to make their own concept films for repeated use, once due care is taken to arrange experiments involving time and labour.

I am not aware of any attempts made so far to produce such concept films in 16 mm. variety. Even if such attempts have been made before, I think, 8 mm. cassettes of concept films would prove to be more helpful for classroom use.

EPILOGUE

At the first meeting of the WCOTP Committee on Audio Visual Instruction, held in Stockholm in 1962 it was decided to prepare this paper, in view of the feeling that 8 mm. system might afford some relief to those who are anxious to use films in education but cannot do so far various reasons, mainly, the cost involved in using 16 mm. system. Non-availability of electric power in rural areas was also pointed out to be a formidable obstacle in the way. Low power consumption of 8 mm. projector has enabled manufacturers of this equipment to offer storage battery operated machines. There is no need to worry on this account also.

At the Stockholm meeting there was general agreement on the point that the modern developments in Communication Media could no longer be ignored even in the so-called underdeveloped countries. National Educational Organisations of such countries should eventually be persuaded to keep in line with the more advanced countries of the world. WCOTP was considered to be in a better position to achieve this object by suggesting ways and means to get over the possible social, economical or environmental difficulties. Our efforts will be more than rewarded if this paper serves some useful purpose in offering any semblance of relief to those who are keen on introducing films in education on a proper basis, but could not do so till now.

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3. "Popular Photography", June 1962 issue, "The slow, sure triumph of 8 mm".
4. Reference is also invited to an article on "Screen Education", by Gordon Marams, in the Unesco Features, No. 410 of February 1963.

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ANNOTATED LIST OF FILMS

TITLE INDEX

By Road, Rail and Air
Call of the Flute
Family Planning Why
Folk dance of Saurashtra
Global Struggle for Food
Hoppity Pop
Indian Leather
Introducing Insects
Life and Message of Swami Vivekananda
Life in Hot Dry Lands
Life in Wood Lot
Man and his Resources
Promise and Reassurance
Postman
To Each a rightful Share
Glaciers
Understanding our Earth
Rocks and Minerals

SUBJECT INDEX OF FILMS

BIOGRAPHY
(i) Life and Message of Swami Vivekananda

BIOLOGY
(i) Life in Hot Dry Lands
(ii) Life in Wood Lot

DANCING FOLK AND NATIONAL DANCING
(i) Call of the Flute
(ii) Folk Dances of Saurashtra

ECONOMY
(i) To Each a Rightful Share

FAMILY PLANNING
(i) Family Planning Why

SUBJECT INDEX

FOOD SUPPLY
(i) Global Struggle for Food
GLACIERS
(i) Understanding Our Earth: Glacier
INSECT
(i) Introducing Insects
LEATHER
(i) Indian Leather
PHOTOGRAPHIC METHODS
(i) Hoppity Pop
NATURAL RESOURCES
(i) Man and His Resources
POSTAL SERVICE
(i) Postman
REHABILITATION
(i) Promise and Reassurance
ROCKS
(i) By Road Rail and Air

ANNOTATIONS

LIFE IN HOT DRY LANDS

Coronet Eng. 11 mins. 754

The film tells the story of the fierce battle of survival waged by the starving plant life, the animals, the human beings of the desert who adopt themselves to this grim existence. Pupils will learn where the desert areas of the world are located and why they are barren wastelands.

Suitability : For secondary and college students.

BIOLOGY.

LIFE IN WOODLOT

N.F.B.C. Eng. (Col.) 16 mins. 574

A surprising peep into the hidden world of the under-bush where silent relentless rivalry is concealed. What the film brings into focus is a pyramid of life in which adders sustain and support the higher orders. The grub lives on the fallen log, a fledgling grouse chick feeds on grubs; a snake strikes at the fledgling chick and in turn is seized by a hovering hawk. In the plant world, the film witnesses a similar struggle, the struggle for supremacy. Here is a view of nature that will enrich your walks in wood; and understanding of a natural law that demands respect.

Suitability : For students of biology. BIOLOGY.

INTRODUCING INSECTS

N.F.B.C. Eng. (Col.) 17 mins. 595.7.

A veritable who's who of the insect world, *Introducing Insects* ushers you into a wonderland of nature for an absorbing study of creatures more colourful and quite as complex as the larger form of animals. The film considers such questions as : What really is insect development while illustrating methods of classification from tiny flea to the giant six-inch Goliath beetle. You see representatives of insect populations that outnumber all other forms of life.

Suitability : For secondary schools and colleges.

INSECTS.

INDIAN LEATHER

F.D. Hindi (Col.) 12. mins. 675.2.

Indian leather has been known all over the world for centuries for its durability and quality. The film depicts the various processes involved in making leather. Most of the hides are obtained from villages spread all over the country. Other types of leather are prepared in modern factories under the care of experts. Also shown here are a variety of articles made from leather—shoes, suitcases and ladies hand-bags etc.

Suitability : For all groups. LEATHER.

HOPPITY POP

N.F.B.C. Eng. (Col.) 6 mins. 770.1

An animated film by Norman Mclaren, in which coloured shapes dance in tune to old-fashioned calliope music. The film is made without camera, by drawing directly upon the film with ordinary pen and ink. Simple, swift moving forms dance about the screen carrying out the mood of the music as humorous aspects of the old-time circus Calliope missing steps and tendency to go out of tune are all included on the sound track.

Suitability : For trainees in A.V. Education. PHOTOGRAPHIC METHODS

FAMILY PLANNING, WHY

Film Div. Hindi 11 mins. 301.426

The film has covered the different aspects of life for showing why planned family is necessary in a healthy developing society.

Suitability : For adult groups, FAMILY PLANNING

TO EACH A RIGHTFUL SHARE

N.F.B.C. Eng. 29 mins. 330

Riots in Africa, India's campaign of non-violence, Japan's challenge to western industrial superiority, the new zeal with which Asiatic people bent their backs to improve their land; all these are seen in this film as part of a great movement by backward or developing countries, towards an economy comparable to that of the west.

Suitability : For adult groups, ECONOMY

MAN AND HIS RESOURCES

N.F.B.C. Eng. 29 mins. 333

Man and his resources, without special reference to national boundaries, presents searching comparison between the priviledged and the under-priviledged parts of the world, between the super-abundance of the one and the abject misery of the other. The whole range of social and economic disparity is examined from literary to industrial out-put and techniques.

Suitability : For adult groups. NATURAL RESOURCES

GLOBAL STRUGGLE FOR FOOD, THE

N.F.B.C. Eng. 29 mins. 338.19

The Global Struggle for Food is a progress report on efforts to stave off the threatening crisis in world food supply to find new ways of feeding the earth's swelling population.

Suitability : For adult groups. FOOD SUPPLY

PROMISE AND REASSURANCE

F.D. Hindi 16 mins. 355.1156

The assistance and facilities provided for the families of servicemen and the various measures taken for rehabilitation of ex-servicemen are detailed in this film.

Suitability : For Army Personnel

POSTMAN, THE

N.F.B.C. Eng. 17 mins. 383.1

The friendly postman brings Jimmie Dolans in Ottawa a letter from his cousin in Saskatchewan. Jimmie decides to answer it right away and the postman tells him just how his letter will travel back to the Prairies. The film follows the letter from the corner mail-box through the post office with its many departments, safely to its destination two provinces away, Jimmy realizes how many people co-operate in getting a letter from one place to another, and how the work of the post office ties all places together.

Sutability : For all groups. POSTAL SERVICE

BY ROAD, RAIL AND AIR

F.D. Hindi 14 mins. 385

A survey of the achievements in the field of land and air transport during the First and Second Five-Year Plans and the targets set for the Third Plan.

Suitability : For all groups. TRANSPORTATION

UNDERSTANDING OUR EARTH : ROCKS & MINERALS

Coronet Eng. 11 mins. 552.3.

The three classes of rocks—igneous, sedimentary and metamorphic are related to the natural conditions that produce the minerals. The various uses of rocks and minerals in their natural state are explained.

Suitability : For students of college and secondary classes, ROCKS

UNDERSTANDING OUR EARTH : GLACIERS

Coronet Eng. 11 mins. 551.312.

Glaciers from Alaska, The United States, Canada, and Europe show the different kinds of glaciers and how they are formed. The formation of icebergs and

the significance and impact of glaciers during the ice age are discovered. Evidences of glaciations are seen in glacier lakes in the Rocky mountains, soil in the middle west, glacial drift in New England, and the Matterhorn peak in the Swiss Alps.

Suitability : For secondary college students. GLACIERS

CALL OF THE FLUTE

F.D. Hindi (Col.) 18 mins. 793.31.

The dances of Manipur famed for their charm and elegance are depicted in this film. It also gives an idea of the colourful land and its people. The dances have been filmed in their authentic settings in Manipur.

Suitability : For all groups. DANCING FOLK AND NATIONAL DANCING

FOLK DANCES OF SAURASHTRA

F.D. Hindi (Col.) 18 mins. 793.31

The film reviews some of the folk dances of Saurashtra showing that love for dance and music forms an integral part of the people's life.

Suitability : For all groups. DANCING FOLK AND NATIONAL DANCING

LIFE AND MESSAGE OF SWAMI VIVEKANANDA

F.D. Hindi 74 mins. 922.94

A film on the life and message of Swami Vivekananda an exponent of Hindu philosophy, humanist and ardent follower of Ramakrishna Paramahansa.

Suitability : For all groups of BIOGRAPHY

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Mathematics			
510·85	Exponantial Law and Applications	Mid. Hr. Sec.	27
513	Area of Circle	Do	36
513	Treasures of the Triangle	Do	40
513·1	Introduction to Area	Do	41
521·2	Distant World Glaciers	Do	45
523·2	Solar System	Do	34
523·2	The Solar System in the Universe	Do	26
523·3	Moon	Do	41
523·3	Our Earth	Do	60
523·3	Origin & Age of Earth	Do	38
523·3	Astronomy—The Moon Planets	Do	40
523·51	Origin of Earth and Planets	Do	51
523·51	Meteorites	Do	58
523·6	Comets & Meteors	Do	39
523·7	Beneficient Sun	Do	55
523·7	The Sun	Do	38
523·8	The World of Stars	Do	39
525	The Earth Latitude and Longitude.	Mid. Hr. Sec.	60
525	The Earth on which we live	Do	23
525	Mother	Do	58
525	Structure of Earth	Do	63
525	Mother Earth	Do	144
525	The Structure of Matter	Do	
525·3	Movement of the Earth's Crust	Do	38
525·3	Our Earth	Do	60
525·3	The Earth—its Motions	Do	24
525·5	Life in the Autumn	Do	30
525·5	Life in the Summer	Do	30
526·8	Map Making	Do	36
Physics			
530	National Physical Laboratory	Sec. Classes	52
530·1	Archimedes Principle & Floatation	Mid. and Sec. Classes	30
531	Movement & Energy— Part 1,	Do	32
	Part,	Do	40

Cl. No.	Title	Suitability Mid. & Sec.	No. of Frames
	Part 3,	Classes	52
	Part 4,	Do	52
	Part 5,	Do	44
	and Part III,	Do	43
531	Source of Energy Part I,	Do	36
	and Part II,	Do	42
531 ·3	Levers	Do	40
532 ·2	Fluid Pressure	Do	6
533 ·6	Aerodynamics Pt. 1,	Do	30
534	Sound	Do	46
535	Light	Do	46
335	Light into Colour	Do	27
536	Energy	Do	45
536	Waves	Do	40
536	Heat Process and Application	Do	34
537	This Land of Ours	Do	40
537	Compass & Electric Motor	Do	46
537	Electricity	Do	31 ·48
537	Electricity & Magnetism	Do	37
537	Electricity at Work	Do	44
537	Resistance	Do	30
537	Electricity Condensers	Do	27
537	School Lightening by Electricity	Do	33
537 ·1	Magnets	Do	45
539	Electronics The Radio Valves	Do	22
539	The Principles of Electricity Laws and Theories	Do	30
539	Movement & Energy Part II	Do	37
539	Current Electricity Part I	Do	70
	Part II	Do	101
539	Operation and use of Transformers	Do	101
539 ·76	Atomic Energy	Hr. Sec. Classes	87
Chemistry			
541	Facts and Laws	Hr. Sec. & Middle Classes.	31
541 ·2	Chemical Changes	Do	31

Cl. No.	Title	Suitability	No. of Frames
541 ·2	Molecules and three States of Matter	Hr. Sec. & Middle Classes	38
546	Composition of Air Oxygen	Do	21
546	Nitrogen & Cellulose Compound	Do	54
546	Hydrogen & Oxygen	Do	45
546 ·2	Sulphur & its Compounds	Secondary Classes	44
546 ·4	Claciun and its Compounds	Do	42
546 ·4	Story of Radium	Do	72
547	Chlorine and its Compounds	Do	45
547	Carbon ; its Oxides	Do	
547 ·8	Carbon and its Compounds	Do	60
547 ·2	The Food Cycle Part I Carbon	Do	36
547 ·92	Carbohydrates and the Calories	Do	36
549	Metal, Coal & Steam	Do	41
Geology and Geography			
551	The Geological Action of Wind & Ice	Sec. Classes	43
551	Geology of the Sea and Lakes	Do	34
551	Earthquakes (Russian)	Do	52
551	Earthquakes		22
551	Earthquakes & How they are recorded	Do	33
551 21	Volcanoes	Do	33
551 ·31	Tennesse Valley Authority	Do	33
551 ·31	Active Glaciers	Mid. & Sec. Classes	32
551 ·31	Icebergs & Glaciers	Do	46
551 ·37	Weather & Wind Deposits	Do	28
551 ·37	Weathering, the Geological action of ground water and the organism	Do	28
551 ·4	The advancing deserts	Do	27
551 ·4	The Father of the Water—The Amazon	Do	34
551 ·4	Ground Water	Do	35

Cl. No.	Title	Suitability	No. of Frames
551 ·4	Deserts	Mid. & Sec. Classes.	21
551 ·4	Graften & the Clarence River	Do	22
551 ·4	Mount Lofty Ranges	Do	56
551 ·4	The River Murray	Do	49
551 ·4	River of Ice	Do	50
551 ·4	The River Thames	Do	58
551 ·4	The Tyrolese Alps	Do	48
551 ·4	The Vanishing Praire	Pry. & Mid. Classes	32
551 ·4	Wind and Power	Mid. & Sec. Classes	39
551 ·409494	Swiss Alps	Do	49
551 ·48094	The English Lake District	Do	41
351 ·40942	Clyde River	Do	40
351 ·40944	The French Riviera	Do	51
551 ·41	Continental Ice Sheet	Do	32
551 ·42	The Wonderful Story About Coral Reef	Do	30
551 ·48	Country Walks by the Stream	Pry. & Mid. Classes	42
551 ·48	The English Lake Land	Do	45
551 ·48	The Geological Action of Running Water	Middle and Secondary Classes.	40
551 ·48	Westward Rolls the River		
	Part I	Do	62
	Part II	Do	19
551 ·48	The English Lake District (one Film-strip)		
	Part I	Do	42
	Part II	Do	32
551 ·49	Niagara	Do	44
551 ·49	General Science Water	Pry. & Mid. Classes.	73 ·3
551 ·40	Water		
5511 ·5	Where the Rainbow Ends	Do	25
551 ·5	Atmosphere	Mid. Sec. Classes	40
551 ·5	Elements of the Weather and atmospheric circulation	Mid. Classes	42
551 ·5	Clouds	Do	46
551 ·5	Tropical Savannas	Do	32
551 ·5	Wind. Pt. 1	Do	46
551 ·573	Snow & Ice	Do	25
551 ·59	Climates of the West Coast	Do	50
551 ·59	Man and his Climate Environment	Do	65
551 ·71	Archeozoic, Proterozoic and Cambrian Periods	Do	39
553	Sodium Chloride and Halogens	Do	34
553 ·6	Salt	Do	22
560	The Story Fossils Tell	Sec. Classes.	22,54
560 ·17	Triassic and Jurassic Periods	Do	44
560 ·17	Tertiary and Quaternary Periods	Do	38
Biology			
563 ·1	Protozoa	Sec. Classes	34
563 ·4	The Story of Sponges	Do	54
565 ·7	Round Worm	Do	76
567	Origin of Fauna	Do	48
568	Triumph of Dinosaurs	Do	55
568 ·1	The Rise of Dinosaurs	Do	56
569	Discovering Fossils	Do	45
570	Life on a Heath	Do	42
571	Bronze	Mid. Sec. Classes.	31
571 ·1	The Old Stone Age	Do	28
571 ·2	The New Stone Age	Do	28
571 ·2	Pastoral	Do	35
571 ·4	Iron Age	Do	32
573 ·2	Origin of Man (R)	Do	63
574	Life in a Stream	Do	40
574 ·07	Along a Sierran Trail	Do	50
574 ·07	How animals reproduce themselves	Do	25
574 ·3	Chick Embryology	Do	32
574 ·3	Reproduction among Mammals	Do	84

Cl. No.	Title	Suitability	No. of Frames
574 ·9	The Living Desert	Sec. Classes	42
574 ·9095	The Great American	Do	56
574 ·9095	Mammals of the Desert	Do	46
574 ·9095	Plant Life of the Desert	Do	51
574 ·9095	Small Creatures of the Deserts	Do	42
574 ·9095	Reptiles of the Desert	Do	49
574 ·9095	Survival in the Desert		
575 ·12	Heredity	Do	63
576	The Story of Life	Do	32
579	For Juniors,		
	Ist Collection	Do	25
	2nd Collection	Do	25
	3rd Collection	Do	25
	4th Collection		
Botany			
580	Textile and Fibrous plants	Do	33
581	Preparation and Planting Herbaceous Border	Mid & Sec. Classes	39
581	Insectivorous Plants	Do	30
581	Curious Foreign Plants	Sec. Classes	34
581	Kew	Do	50
581	Life in a Meadow	Do	44
581	Plant Nutrition	Do	28
581	Pollination Pt. 1	Do	36
581	Some Plants of California Deserts	Do	48
581	The Story of a Seed	Pry. and Mid Classes.	72
581	Various Food Plants	Do	36
581	Various Useful Tropical Plants	Do	31
581	Woodland Plants	Do	49
581 ·1	Medicinal & Poisonous Plants	Mid. & Sec. Classes and Above.	36
581 ·61	Role of Plants in Development and Life of Earth	Do	42
582 ·13	Grassland Plants	Do	46
583 ·13	Summer Wild Flower	Pry. & Mid. Classes	52
582 ·16	Trees Pt. 2.	Do	30

Cl. No.	Title	Suitability	No. of Frames
582 ·16	Trees Pt. 3	Pry. Mid. Classes.	25
	Part 4	Do	38
	Part 5	Do	36
582 ·16	Trees of Valleys and Foothills	Do	48
582 ·16	Typical Trees of Many Lands	Do	62
583 ·48	Spices	Do	27
583 ·6	Country Walks Across	Do	
589 ·47	Pored Plants	Do	36
589 ·47	Life in Ponds	Mid. & Sec. Classes.	58
589 ·9	Health Helpers (Col).	Pry. & Mid. Classes.	48
Zoology			
590	Animal Life of Subtropical Grassland	Mid. Classes and above.	39
590	Animal Life of the Open Space I.	Do	38
590	Animal Life of the open Space II-The Savanna, The Desert.	Do	40
590	Animal Life of the open Space III-The Tundra	Mid. & Sec. Classes.	36
590	Antartic Animals	Do	35
590	Creatures that creep swim and fly.	Pry. & Mid. Classes.	27
590	Domestic Animals in other Latitudes		
	Part I	Do	38
	Part II	Do	40
590	Smaller Pont Animals	Do	36
590	Animals for Africa	Pry. & Mid. Sec. Classes.	26
590	Cretaceous & Tertiary Periods		
591 ·096	Elephant in Africa	Do	40
591 ·096	King of Beasts	Do	50
591 ·096	Larger Animal of Africa (The African Lion)	Do	47
591 ·096	The King's Realm	Do	48
591 ·096	Life & Death on the African Plain	Do	48
591 ·1	Some Deserts Animals and how they live	Do	50

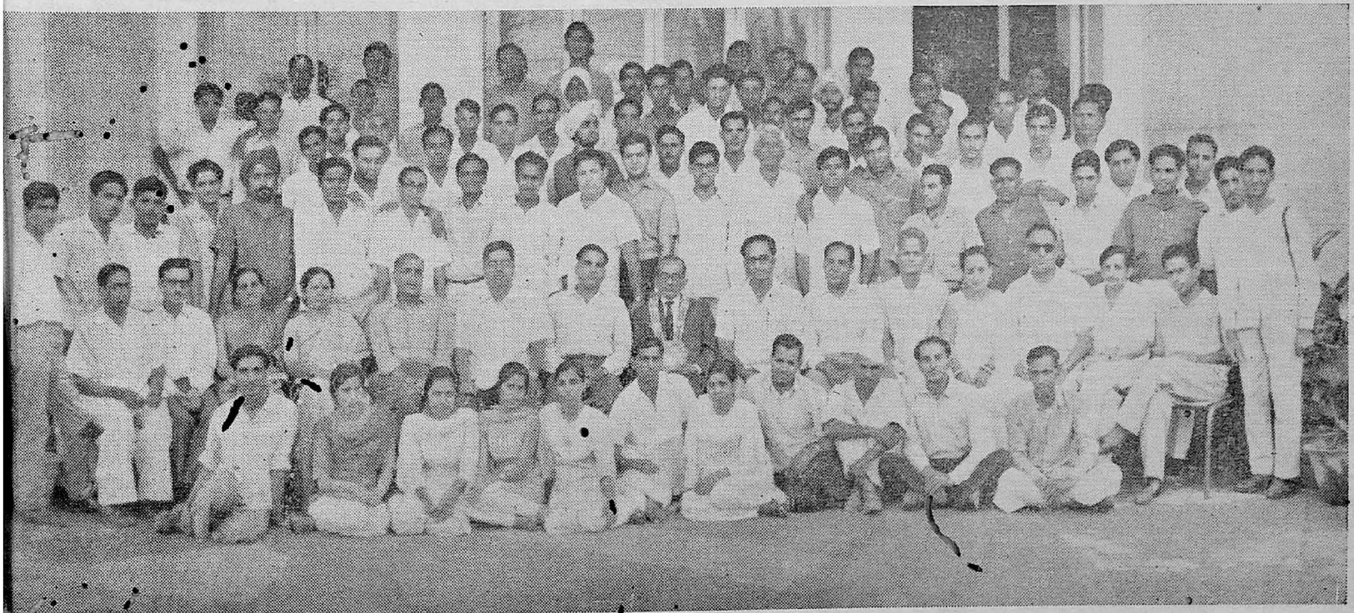
Cl. No.	Title	Suitability	No. of Frames
591·1	How Animals Get Air	Pry. & Mid Classes.	50
591·1	Wild Life in East Africa	Do	25
591·1	How some Animals get Food	Do	50
591·15096	Antelope and Smaller African Animals	Do	52
591·4	Animal Metamorphosis	Sec. Classes	30
591·5	Forestine Animals	Do	39
	Part I		
	Part II	Do	34
591·5	Hibernation	Do	38
591·5	How Animals are Protected from their Enemies.	Pry. & Mid. Classes.	30
591·5	How Colour Protects Animals	Do	50
591·92	Pond Life II	Do	28
592	Larger Pond Animals	Do	36
593·7	Hydra & Obelia	Sec. Classes	35
595·12	Platypus & Echidna		
595·4	Phalangers or Possums	Do	44
595·14	Early Development of Amphioseus		
595·44	Some spiders and how they live	Pry. & Mid. Classes	32
595·44	Spiders	Do	56
595·7	Butterflies	Do	48
595·7	The Growing up of the Buckmoth	Do	22
595·7	The Growing up of the Monarch Butterfly	Do	29
595·7	How Insects get food	Do	22
595·7	How Insects grow up	Do	48
595·7	The Life of Swallowtail Butterfly	Do	42
595·7	Moths	Mid. & Sec. Classes.	50
595·799	Fibo	Mid. Classes	36
595·70942	British Butterflies I	Do	33
	II	Do	32
595·70942	British Insects	Do	58

Cl. No.	Title	Suitability	No. of Frames.
596	Extinct Animals	Sec. Classes and above	52
596	Extinct		
	Vertebrates I	Do	44
	Vertebrates II	Do	56
	Vertebrates III	Do	41
	Vertebrates IV	Do	45
596	Life on the Seashore	Mid. & Sec. Classes	35
597	Eight Little Frogs	Do	31
597·3	Frogs, Toads and Salmandars. How they Live	Do	50
597·3	Frogs, Toads and Salmandars		
597·3	The Frog	Do	37
597·3	The Growing—The Toad & Tree Toad	Do	22
597·3	Growth and Metamorphosis	Do	29
598·1	The Coming of Reptiles	Do	39
598·1	Lizards, Snakes and Turtles	Mid. Classes	42
598·1	Some Lizards, Snakes and other growing animals	Do	50
598·2	British Birds—The Reed Warbler	Do	28
598·2	British Sea Birds	Do	39
598·2	Beaks & Feet of Birds	Pry. & Mid. Classes.	52
598·2	Birds Beaks and Claws	Do	30
598·2	Birds in Summer and Autumn	Do	30
598·2	Birds in Winter and Spring	Do	30
598·2	Birds Rocks	General	35
598·2	Bird Studies	Mid. & Sec. Classes.	38
598·2	How young birds get food	Do	30
598·2	The Life of the Horned Lark	Do	50
598·2	The Rook	Pry. Mid. & Sec. Classes	35
598·2	Satin Bower Birds	General	40

Cl. No.	Title	Suitability	No. of Frames
598·2	Seax Birds	Pry. Mid. Classes	40
598·29	The Growing up of a Barn Owl.	Do	29
598·29	The Growing up of the Texas Nighthawk	Do	32
599	Age of Mammals (col.)	Mid. Sec. and above	57
599	Mammals the furry of Hairy Animals	Do	48
599	Bats	Do	46
599	Our Own Domestic Animals	Do	32
599	The Teddy Bears' Picnic	Pry. Classes	28

Cl. No.	Title	Suitability	No. of Frames
599·0942	British Wild Life	Pry. Mid. Classes	34
599·2	Kangaroos Junior Steps Out	Do	26
599·32	Dormouse	Do	25
599·32	Red Squirrel	Do	37
599·32	Wild Rabbits	Do	29
599·3233	Care of pets Mice (Col).	Do	29
599·5	Whales & Whaling	Mid. & Sec. Classes.	38
599·61	The Elephant	Do	31
599·44	Hedgehog	Do	36

FAREWELL TO SHRI G. K. ATHALYE



Shri G. K. Athalye, with the staff of the N.I.A.V.E. on the eve of his departure for Kabul on a Unesco assignment.

Shri Prem Kirpal, Director, National Council of Educational Research and Training, presented the Council Emblem to Shri Athalye at a farewell function held at the N.I.A.V.E.

Shri G. K. Athalye, first Director of the National Institute of Audio Visual Education, who left for Kabul on a Unesco assignment.

P38+48+34+12+IV+36 with cover page 2
21/9/68

A silver bowl was presented to Shri Athalye on behalf of the staff of N.I.A.V.E.

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